GAS JOURNAL, APRIL 26, 1939

VOL. 226. 91st YEAR. No. 3962.

Editorial Notes

Central Laboratories

In a letter published in to-day's "JOURNAL" under the title "A Central Testing Laboratory," a correspondent pays tribute to the wonderful work carried out at the Watson House Laboratories of the Gas Light and Coke Company and the speed with which this work is made available to the Gas Industry as a whole. He also calls attention to a letter which appeared in *Chemistry and Industry* on April 15. That letter was by Dr. U. R. Evans, of Cambridge University, and it was inspired by the Perkin Medal Address delivered this year by Dr. W. S. Landis before the American Section of the Society of Chemical Industry and the New York Section of the American Chemical Society. It can be found in *Chemistry and Industry*, the issue being that of April 8. We know that many in the Gas Industry are members of the Society of Chemical Industry and may have noted the Address—the title of which, "An Early Chapter in Argon Production" had nothing to do with the purport of Mr. Clark's letter. We also know that many in the Gas Industry will not have seen the Address, and think that the letter stands in need of some amplification.

Tucked away in the Address were some extremely interesting comments on research and laboratory organization, and the opinions expressed are born of long and wide experience. They are especially apposite in view of the suggestions put forward on many occasions regarding the establishment of a Central Laboratory for the Gas Industry. Dr. Landis discussed a phase in the rapid development of the technique of argon production. It was in America in the early years of the War, and he himself took part in the work, together with an experienced operator, a constructional engineer, and a designing engineer. "I believe our great success," he said, "was due entirely to the fact that there were only four of us working without the burden of formal organization. There was no red tape. We were not concerned with burdensome reports for the education of uninformed executives."

Dr. Landis then contrasted this with the work of the great modern laboratories, with their wonderful equipment, and large staffs of technicians, engineers, and chemists; and he suggested that, in comparison with the small organization, their production is far less efficient measured in terms of man-hours. What, he asked, would have happened had Davy been put in charge of one of these modern laboratories? And he supplied the answer as follows: "Fifty per cent. of his time would have been spent on the telephone answering absurd questions from people incompetent to ask them, who could make no effective use of the knowledge after receipt. Another 25% would have been spent acting as a traffic cop for a multitude of office correspondence that starts somewhere and gets nowhere. And the other 25% with worrying about the detail of a slip-up in store-room routine when three 5 cent bolts were charged to the wrong job."

We are believers in team-work research and the pooling of resources. The investigation on the reduction of sulphur compounds in gas, the results of which were presented to The Institution of Gas Engineers in November, 1937, was a fine example of the great value of team-work. We have had many other examples. It is obvious that certain types of research and testing are unsuited to the small laboratory. Yet the danger of over-organization cannot be dismissed from mind, and there must be a stage when efficiency and output do not increase in direct ratio to growth in size.

In his Address, Dr. Landis, referring to the pioneer work on argon production, said that the need for intense analysis of their problem worked for speed of accomplishment. It is of this "speed of accomplishment" that Dr. Evans wrote in *Chemistry and Industry* for April 15. He pointed out that, should there be a war, all manner of unexpected scientific and technical problems would arise, calling for instant solution. "Speed of accomplishment" would be vital. It would, he argued, be a great mistake if our original thinkers who might grapple with new problems as they arose were sucked into existing giant organizations to do routine work. He urged that there should be certain reserves of originally minded people retained in places sufficiently free from red tape to render thinking to some extent possible. There is a great deal in this, and it applies to the Gas Industry in time of peace.

Administrative Training

THE tendency in the Gas Industry is towards larger units and more and more specialization. The engineer, the chemist, the sales manager—each has a definite function to perform, and this naturally tends to make him concentrate solely on his own function and work in a watertight compartment. Yet the success of any gas undertaking depends on the proper co-ordination of the various departments so that the unit as a whole may work smoothly, efficiently, and to a plan. This needs a co-ordinator, a man of administrative ability. The technical expert must be subject to the administrator who frames the policy of the undertaking, and the technical expert often feels a sense of grievance on that ground. But there is no reason why the administrator should not also be a technician scientifically trained.

A most interesting Paper was given by Mr. E. S. Byng last week at a meeting of the Institution of Chemical Engineers on the subject of administrative training for the chemical engineer—and, after all, the Gas Industry is essentially a chemical engineering industry. In that Paper the Author said that the directors of industrial organizations would not tend to look outside for managerial recruits if the engineers within the organization displayed a capacity for and a thorough understanding of administrative duties. It was pointed out recently that many many men who have specialized, it may be as chemists, have done what they have set out to do, and have no further goal in view. The chemist who is administratively minded, however, should have another objective. For the culmination of his career he seeks administrative responsibility and he needs therefore to know how he may qualify himself for it. It must be borne in mind that administrative duties merge into managerial and departmental duties and are not confined to the high control of an organization. The industrial world, said Mr. Byng, has need of captains and lieutenants as well as field marshals.

It has been said times without number that the salesman is born, not made. It is agreed, however, that for gas salesmanship training is essential. The same has been said about the administrator. But the means now exist for the gas engineer and the gas chemist—in other words, the chemical engineer—to gain a sound knowledge of the technique of industrial administration, and Mr. Byng's Paper was an invitation to chemical engineers to consider the possibilities of advancement that lie within the administrative field; and the information he gave should prove useful and act as an incentive to young engineers and chemists to study business and management principles. There is no doubt about the Gas Industry's need for men who combine technical skill with administrative knowledge, and there is no doubt about Mr. Byng's contention that the young chemical engineer who extends his training over the problems of industrial administration will gain not only a wider field of interest but an added confidence in entering upon his career.

Safety

ON Thursday and Friday of last week a series of valuable Papers dealing with safety in chemical works was read before the Chemical Engineering Group of the Society of Chemical Industry, in conjunction with the National "Safety First" Association. These Papers must be of great interest to the Gas Industry, which has an enviable record in regard to accidents, considering the possibilities of mishap in the process of gas manufacture and the recovery of by-products. One of the Papers was by Mr. Wilkes and Dr. Matheson, H.M. Inspectors of Factories. One of their duties is to read the reports on all the gassing accidents that come under the notice of the Factory Department, and to take a direct part in the investigation of many of them. They divided their Paper into two parts, one dealing with "surprise" gases, the other with "expected" gases. In the first part they referred to the unexpected way in which hydrogen sulphide may appear in concentration on benzole washing plant. In the second part they pointed out, as a result of their experience, that no single item in chemical plant has caused as many gassings and explosions as defective valves, including in the term "defective" valves which have been temporarily defective simply because they were not properly closed, although perhaps they were actually sound. If leakage of a valve can conceivably cause danger, then it should never be assumed without test that a valve is tight or is properly closed. It was, of course, emphasized in the report of the Safety Rules Committee of The Institution of Gas Engineers, presented at the last Autumn Research Meeting, that all gas-works valves should be operated at regular intervals to ensure that they are in working order. A regular scheme of operation of all gas-works valves should undoubtedly be one of the safety precautions at all gas-works. But mere operation does not indicate that valves are necessarily in good condition. Not only should they be operated at frequent intervals, but at less frequent intervals they should be inspected, and the time of their examination and testing should be recorded.

Then the Authors referred to the difficulties of operating oxide purifying plant without danger. They spoke of the "rather rare" method of purging the boxes with inert gas before they are opened up. Admittedly the purging of plant by inert gases is comparatively new to the Gas Industry, but we have no doubt at all that it will become more and more general, in works large and small alike. An inert gas purging machine has been developed which is now available on hire to gas undertakings; and with such a perfectly safe method available, why should anyone ignore such a means of carrying out a task which may be accompanied by risk? The Authors pointed out that the use of iron and steel tools on such inflammable material as spent oxide is risky. In this regard there are now available tools of all sorts in beryllium bronze, and they have proved entirely satisfactory in use in connexion with oxide purifiers.

Another Paper at the conference dealt with the detection of toxic gases and vapours in industry. It was by Dr. Vallender, of the Chemical Defence Research Department. We have recorded in the "JOURNAL" the progress which has been made—and it has been both rapid and substantial—in the development of tests by the Department. The task was not easy, and the work is still being carried on. For hydrogen sulphide, for example, it was necessary to determine concentrations at least as low as one part in 30,000, this being usually considered to be the lowest concentration likely to produce harmful effects. Actually a technique has been developed whereby concentrations as low as one part in 150,000 can be detected within a minute or so. It has recently been shown that the atmosphere should not be allowed to exceed one part of carbon bisulphide in 100,000 if serious illness is to be avoided—that is, with lengthy exposure. Here again a technique has been developed by which, in a minute or so, one part in 120,000 can be detected. The test for carbon monoxide is slower, 40 minutes being required to estimate a concentration of one part in 12,000. Yet the test gives an almost immediate indication of a concentration which it would be dangerous to breathe for even a few minutes. The

sense of smell and the behaviour of animals are both unreliable as general methods for detecting the presence of traces of toxic gases; but now we have a rapid, semi-quantitative method of test, sensitive to very low concentrations of gases and vapours.

The Human Factor

THEN there was the objective Paper by Mr. R. J. Woods on the function of the works management in safety. Mr. Woods' Paper was expressive and he asked for more understanding of, and greater sympathy with the employee. He dealt with the attitude of management to staff, suggesting that in theory the management is safety-minded, but that in practice it is left to the individual workman to carry out existing regulations and obligations. "Failure of the human element," he said, "is a term which nearly always suggests carelessness, negligence, or excessive zeal on the part of the workmen." A further viewpoint was that staff people take a detached view of safety, treating it as primarily the concern of the workmen. Again, "an accident prevention scheme often includes provision for an internal investigation into accidents. This sometimes puts the victim into the position of a defendant. Usually a potential defendant—the management—sits in judgment on the case."

We think that the workmen's position in the Gas Industry has received sympathetic treatment. "Workman" is a word which we dislike, because it is vague. In the Gas Industry all are, or should be, workmen together; and we believe that there is a co-partnership of interests strongly welded. The manufacture of gas is not easy, but the number of accidents occurring from rendering gas service universally available is so small that there must be a strong union between employer and employee in the Industry. Which is not to say that effort towards reduction in accidents will be relaxed.

Towards a Goal

IT would be useful if every manufacturer of gas making and using equipment could say to the makers of gas that he was employing gas exclusively for the production of his equipment. The Gas Industry is asking for low-priced appliances. We know that some manufacturers of first-class appliances are not using gas exclusively in their production. It may be that the price at which gas can in certain cases be offered is incompatible with lowest production costs.

We know, too, that many manufacturers are using town gas exclusively. It strikes us that they might to the advantage of themselves and also to the advantage of the Gas Industry of which they are an essential part, tell everybody about it.

Why should they not tell this through their advertisements? And why should it not be announced through the columns of the "JOURNAL"? Surely it would spur gas undertakings to offer attractive rates to the manufacturers of gas using equipment. It would, we think, help makers if they boldly stated in their advertisements that they used gas.

Forthcoming Engagements

April.

27.—**I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
28.—**I.G.E.**—Specifications Sub-Committee of the Refractory Materials Joint Committee, 2.30 p.m.
29.—**I.G.E.**—Written Examinations in Gas Engineering (Manufacture).

May.

1.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
2.—**I.G.E.**—Finance Committee, 9.30 a.m.; Membership Committee, 10 a.m.; General Purposes Committee, 11 a.m.; Council, 2.30 p.m.
2.—**B.C.G.A.**—Executive Committee, 2.30 p.m.
5.—**North of England Association.**—Annual Meeting at Newcastle.
6.—**I.G.E.**—Written Examinations in Gas Engineering (Supply).
6.—**Manchester and District Juniors.**—Visit to Higginshaw Gas-Works, Oldham. Paper by F. Cartledge on "Coal and Coke Handling Plant at Higginshaw."
6.—**Midland Juniors.**—Visit to Coventry Works of Geo. Wilson Gas Meters, Ltd., and to Foleshill Gas-Works.
8.—**L.C.C.A.**—Technical Committee, 2.30 p.m.
9.—**Federation of Gas Employers.**—Meeting of Central Committee, 11 a.m., at May Fair Hotel, W. 1; Annual General Meeting, 3.30 p.m., at Gas Industry House.
9.—**London and Southern Juniors.**—Annual Business Meeting.
9.—**N.G.C.**—Central Executive Board, 12 noon, at May Fair Hotel, W. 1; Annual General Meeting, 2.45 p.m., at Gas Industry House.
10.—**S.B.G.I.**—Council Meeting, 56, Victoria Street, S.W. 1, 11.30 a.m.; Annual Meeting in the afternoon at the May Fair Hotel.
11.—**Midland Juniors.**—Annual General Meeting. Address by G. Dixon (Nottingham).
13.—**Scottish Eastern Juniors.**—Annual General Meeting at Edinburgh. Presidential Address of R. Cowie, Jnr. (Hawick).
13.—**Yorkshire Juniors.**—Meeting at Harrogate. Short Papers by D. C. Gunn, J. W. Stacey, and H. Ramsden.
16.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
18.—**I.G.E.**—Joint Committee on Complete Gasification under Pressure, 16, Old Queen Street, S.W. 1.
19.—**Southern Association.**—Meeting at Devonport.
23.—**Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Immersion Heating as Applied to Soft Metal Melting."

Personal

Among the six names added by the Lord Chancellor to the Roll of Justices of the Peace for the Borough of Southampton is that of Mr. S. E. WHITEHEAD, B.Sc., M.I.Mech.E., Director, Engineer, and General Manager of the Southampton Gaslight and Coke Company.

• • •

At a meeting of the Board of Directors of the Power-Gas Corporation, Ltd., held on April 14, 1939, Mr. WILFRED BESWICK was elected Chairman in succession to the late Emile Mond. He had been a Vice-Chairman of the Company and was formerly Managing Director for a number of years.

Mr. Beswick has been also elected Chairman of Messrs. Ashmore, Benson, Pease, & Co., Ltd., which is a subsidiary of the Power-Gas Corporation, Ltd., and he is Chairman of Messrs. Davison & Partner, Ltd., which is an associate Company.

• • •

Mr. H. E. STONE, General Manager, Hong Kong and China Gas Company, and Colombo Gas and Water Company, has arrived in London on long leave.

Letter to the Editor

A Central Testing Laboratory

SIR,—I have read with interest the letter published in the "GAS JOURNAL" under the above heading, and would add my quota of praise to the work done at Watson House, and the shortness of the time lag between the work and the benefit derived by the whole Industry.

I would draw the attention of all those interested in laboratories to some very pertinent views expressed by Dr. W. S. Landis in his Perkin Medal Address given at a joint meeting of the American Chemical Society and the New York Section of the Society of Chemical Industry, published in *Chemistry and Industry*, April 8.

Dr. W. R. Evans, of Cambridge University, commenting on this Address (*Chemistry and Industry*, April 15), said: "Buried away in an Address on Early Argon Production are some words which deserve to be read and re-read. . . ."

Yours, &c.,
K. LAMPHIER CLARK.

Weston-super-Mare,
April 17, 1939.

[Editorial comment on this letter is made in to-day's issue.—ED., "G.J."]

News of the Week

For Approval by Resolution, the Bodmin Gas Order, 1939, has been laid before both Houses of Parliament. The provisions of the Order, for which application is proposed to be made to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934, relate *inter alia* to limits of supply and capital.

Seven 10-Year Public Lighting Contracts have been concluded between the Caledonian Gas Corporation and local authorities in various parts of their territory during the past year. This satisfactory state of affairs was referred to by the Chairman, Mr. R. G. Simpson, M.C., C.A., at the fourth annual meeting of the Corporation on April 14. The installations have been carried out in accordance with the recommendations of the Departmental Committee on Street Lighting of the Ministry of Transport. Mr. Simpson expressed the hope that further contracts would be arranged when the benefits of that particular system were more fully appreciated.

A Fierce Fire, fanned by a strong wind, did extensive damage on April 17 to the office of the Aberdeen Corporation Gas Department in Cotton Street. In addition to saving the office, the firemen had to fight strenuously to prevent the fire from spreading to a central block. Most extensive damage was done to a laboratory on the third floor. The fire started in the roof and gained a hold with remarkable rapidity. Although the outbreak was under control in little more than half an hour, about 25 ft. of the roof had collapsed by that time. Instruments and furnishings in the laboratory were severely damaged. The fire is believed to have been caused by a spark from a nearby chimney.

Sanction to a Loan of £7,000 to cover 95% of the cost of installing electrically-driven stoking machinery and coal handling plant at the Gas-Works is to be applied for by the Bridgnorth Town Council. The tenders of Messrs. W. J. Jenkins & Co., Ltd., and Standard Furnace and Settings Company have been accepted for this work.

For a Further Five Years, the Saltcoats Town Council last week agreed to renew the existing contract with the Saltcoats Gas Company for street lighting. The Gas Company will make certain improvements in the lighting system at their own expense. Mr. Lambie gave notice of motion that he would move that the Council enter into negotiations with the Gas Company to acquire the Gas-Works.

A Series of Cookery Demonstrations organized by the Guernsey Gas Light Company from April 11 to 21 were attended by no fewer than 1,430 people. In conjunction with the demonstrations, which were held twice daily, a cake-baking competition was arranged, for which there were 189 adult entries and 54 children. This proved to be one of the finest pieces of publicity the Company have ever put over. The following appliance sales resulted: 42 cookers, two refrigerators, two fires, and one water heater. The demonstrations were arranged by the Davis Gas Stove Company, Ltd. (Radiation Ltd.), and were carried out by Miss E. Sanderson, of the Radiation Research Kitchen. Every one of the prize-winning cakes—12 in all—were baked in "New World" cookers.

A "Personal Appearance" of Mr. Therm

We were introduced the other day by the South Suburban Gas Company to a novel—if not unique—form of publicity. This was a personal appearance of Mr. Therm in the shape of a ventriloquist's doll, made and operated by Mr. R. W. G. Sear, a member of the Company's publicity staff.

The doll measures about 3 ft. in height and is generally constructed on the recognized ventriloquist doll principles—with moving head, mouth, eyes, and fins—but with certain modifications to conform to Mr. Therm's rather unusual form. This actually made the construction a somewhat difficult matter, not merely in getting the head and whimsical expression just right, but also in reproducing a natural movement in the fins without making them appear too rigid or unsubstantial. After many months of patient experiment Mr. Sear achieved his object and succeeded, with his wife's help with the needle and thread, in building up a figure which not only closely follows Mr. Therm's well-known lines, but embodies all the necessary appurtenances of the ventriloquist's doll.

The main body is constructed of wood in which are hidden the various mechanisms which produce the movement. The fins are of red fabric with black edgings, supported within by a strengthening device which keeps them outspread and also gives free movement backwards and forwards. The head has been built up of papier mâché on a foundation consisting of the head of an old doll, with the mouth adapted to open and shut in the course of conversation. The ten points around the head are also constructed of papier mâché, strengthened and varnished, with the spaces between the points filled in with black lines on a yellow background. The whole effect is excellent, Mr. Therm's expression having been obtained to perfection.

Mr. Sear, who is an expert ventriloquist, has been introducing his Mr. Therm at cookery demonstrations in the South Suburban area in connexion with Gas Cooker Fortnight, and everywhere his show went down extremely well with the audiences. He has also arranged shows privately at children's parties and elsewhere and has thereby obtained good publicity for gas. At gas demonstrations he varies the dialogue in accordance with the particular campaign, while Mr. Therm's dress is also suited to the occasion. For example, at cookery demonstrations the doll favours a white coat and a chef's hat: for water heating Mr. Therm is modestly draped in a towel: for gas fire campaigns he wears an evening coat and bow tie: and for refrigeration an Eskimo's ensemble of blue with fur trimmings. Mr. Therm has a rather high-pitched voice—not unlike his voice in the B.C.G.A. cartoon films—while the dialogue is amusing as well as informative. At demonstrations the figure sits on or adjacent to an appliance which is the subject of the campaign.

Valuable publicity has undoubtedly been gained from these ventriloquist shows, and that there are considerable possibilities in this form of propaganda-cum-entertainment is clear from the excellent reception this "personal appearance" of Mr. Therm has had wherever he has appeared. Such shows are useful for putting on between demonstrations or film shows—having the additional advantage of saving the performing rights fees which are payable in respect of gramophone records which are frequently the means of filling in the intervals. We can foresee a busy future for Mr. Therm in this new and ingenious form, and the South Suburban Gas Company are to be congratulated upon being—so far as we have heard—the first to introduce this novel type of publicity, and Mr. Sear on producing his clever ventriloquist doll.

Mr. Sear cross-examines Mr. Therm on the advantages of gas cooking

Further Views from the Ideal Home Exhibition

Above.—A comprehensive display of Hot Water Supply and Central Heating by Thomas Potterton (Heating Engineers), Ltd.
Right.—A Water Heating Exhibit by Ewart and Son, Ltd.
Below.—The fine stand of The Gas Light and Coke Company.

British Standard Specifications

Benzoles, Naphthas, Toluoles, and Xyloles

The British Standards Institution has just issued four specifications dealing respectively with Benzoles, Coal Tar Naphthas, Toluoles, and Xyloles. These specifications are based on the standard specifications of the National Benzole Association, and the methods of testing and the description of the apparatus contained in the Appendices are those which have been recommended by the Standardization of Tar Products Tests Committee.

Benzoles.—The specification for benzoles covers pure benzole, pure benzole for nitration, motor benzole, 90's benzole, and industrial benzole. Although motor benzole is suitable for certain industrial purposes it was felt that there was still a need for a specification for an acid-wash benzole of wide distillation range, and the specification for industrial benzole was, therefore, prepared to cover this need.

Coal Tar Naphthas.—The coal tar naphtha specification covers coal tar solvent naphthas 96/160, 90/160, 90/190, 90/190 unrectified, and 90/200 unrectified.

Xyloles.—The xylole specification covers 2°, 3°, and 5° xylole.

Toluoles.—The toluole specification covers pure toluole, pure toluole for nitration, 90's, and 95's toluole.

Copies of these British Standard Specifications (Nos. 135, 458, 479, and 805) may be obtained from the British Standards Institution, 28, Victoria Street, S.W. 1, price 3s. 6d. each, or 3s. 8d. each, post free.

"Light in Daily Life"*

A Book by Mr. J. S. Dow

There are few people indeed, connected even remotely with light and its allied subjects, who are not personally acquainted with Mr. J. Stewart Dow, author of a recently published book on "Light in Daily Life." Few authors, one feels, are better placed to deal with this subject than Mr. Dow, who is, among his many other activities, Editor of *Light and Lighting* and Hon. Secretary of the Illuminating Engineering Society. Indeed, it is not saying too much to state that his whole life has been devoted to this fascinating subject. "Light in Daily Life" consists of a series of articles which originally appeared in *Light and Lighting*. They deal in a simple and general, but highly interesting, manner with recent advances in the art of artificial lighting and with some of the chief problems with which the illuminating engineer is faced.

The subject is one of evident interest to all users of light and the book should prove of service to them, as well as to students and others vocationally connected with illuminating engineering, as well as furnishing material for a series of popular lectures.

There are available many textbooks containing detailed technical information on illuminating engineering, addressed chiefly to the expert. This book, however, in a sense breaks new ground. It affords the user of light some insight into the essential problems involved in the illumination of street and home, offices, shops, and factories, and enables him to form a better impression of the varied and important applications of light in daily life.

* London: The Technical Press, 5, Ave Maria Lane, Ludgate Hill, E.C. 4. Price 3s. 6d.; pp. 127.

Gas at the New York World's Fair

What the King and Queen Will See

When Their Majesties the King and Queen visit the British Pavilion at the New York World's Fair on their visit to America they will be reminded of home not only by the exhibits but by an actual English garden with flower-beds massed with colour, graceful trees, and old stone paving. The paving, specially transported from England, consists of old stone slabs from Whitehall Gardens and The Tower of London. This garden adjoins the British Buttery. Visitors, seated on a broad terrace (the Buttery accommodates 428 people), will be able to enjoy English food and English beverages and listen to the Band of H.M. Coldstream Guards while they rest after touring the exhibits. Speedy and efficient service of meals is ensured by a kitchen equipped with the latest gas cooking and water heating apparatus.

An important part of the Pavilion is the Cinema, where films relating to life in Britain and the Dominions will be shown. They will include a number of films produced by the Gas Industry, of which may be mentioned the L.C.C.'s Jubilee film, "The Londoners," "New Worlds for Old," the Nutrition film, and "Housing Problems." The Pavilion includes fine administrative offices for the United Kingdom Government commission and a private suite for the Commissioner-General, Sir Louis Beale, K.C.M.G., C.B.E. The Commissioner-General's suite is served by an all-gas kitchen and the offices are warmed by the latest type of gas-fired heating plant.

A more spectacular use of gas at the Fair, however, is its contribution to the "Battle of Creation," a nightly display at the Lagoon of Nations. Here, special underwater gas burners will send up columns of flame 150 ft. into the air. Something like a million cu.ft. of gas will be used in this unique spectacle.

Demonstrators at Radiation Research Laboratories

On Saturday evening, April 15, Radiation Ltd., were hosts to a delegation of domestic science teachers, who were in London for the recent conference arranged by the B.C.G.A.

The party was taken over the Research Laboratory, where they heard an informative talk on gas cookers and also on the working of Radiation gas water heaters. A talk was also given in the Radiation Research Kitchen, where the routine of testing and scientific cooking were discussed. The judging of cake-competitions was also discussed with the aid of some interesting photographs.

An unusual exhibit of canned fruit and tomatoes processed in a "New World" oven was probably the first of its kind to be shown in this country.

During the refreshments which followed many suggestions and ideas were exchanged, and the visitors expressed their enjoyment of a very interesting and helpful meeting.

Approved Coke Burning Appliances

L.C.C.A. Production

The London and Counties Coke Association has published a list of Approved Coke Burning Appliances, and the Association is certainly to be warmly complimented on a fine piece of work.

The production of the list represents several years of work in the testing and development of coke burning appliances in furtherance of the Association's policy towards the more effective utilization of coke. It provides to persons responsible for the heating of buildings an authoritative list of appliances of proper design and construction which can be used and recommended with confidence for the purpose and duty for which they are specified. It is the only published work of its kind dealing with solid fuel appliances and marks an important stage of progress towards the better utilization of coke.

The testing, examination, and development of coke burning appliances is a work which is being continually carried on by the Technical Committee of the Association and the catalogue is arranged so that data sheets may be added as and when new appliances are approved.

In a Foreword to the list on page 2, acknowledgment is made of the great assistance the Association has received in all phases of the work from responsible manufacturers of appliances who are, with the Association, equally concerned to prevent the production of appliances which are unsuitable for use by the general public.

The task of producing the publication must have been arduous and costly, but there can be no doubt that the effort of the Association will be rewarded by achieving improved efficiency for the consumer and by the knowledge that the use of the Approved List by responsible authorities will result in the gradual elimination of the shoddy and unsuitable appliance.

Alleged Maladministration at Southport

The hearing was resumed on April 14 at the Southport Police Court, of summonses against Mr. J. H. Clegg, the Southport Corporation Gas Engineer, and Mr. W. E. Plevin, the Deputy Engineer, alleging conspiracy at the gas-works in illegal practices in the administration of the Gas Undertaking. Reports of previous hearings were published in the "JOURNAL" for March 1, 15, 22, and 29, and April 5 and 19.

Councillor R. A. C. Greaves, in evidence, said he remembered an occasion about the early part of 1937 when, at a meeting of the Gas Committee, of which he was a member, a question arose as to the difference in the figures for calorific value obtained by the works test and the figures obtained by the Gas Examiner. The figures were contained in the monthly report of the Gas Engineer, of which he had received a cyclostyled copy. He was unable to say exactly the month to which this report referred.

The report showed rather a large difference between the two sets of figures, and he (witness) had not been on the Committee long enough to say whether this was the usual difference. He could not remember who pointed out the difference. Mr. Clegg said they were allowed a difference of 5%. He could not remember Mr. Clegg saying anything further as to the discrepancy in the figures at that meeting, but at a subsequent meeting he did explain to them that they could get different figures in a short time between two tests. The figures under discussion were the average figures for the month.

Mr. Hartley Shawcross: Did Mr. Clegg then, or at any other time, to your knowledge, inform the Gas Committee that the works had been consistently supplying gas of a lower calorific value than that which they were required by the law to supply?—No.

Charles Halsall, a clerk in the Gas Department at the Eastbank Street Offices since 1914, said it had been part of his work to prepare the figures in the draft of the Gas Engineer's monthly reports to the Gas Committee. He had been doing the work since 1932. The information from which the figures for the reports were compiled was mostly obtained from a book called the Crowlands stock book. The book contained figures of the calorific value of the gas supplied from month to month.

"There have been occasions when Mr. Clegg has told me to alter the figures or has altered them himself," alleged witness.

Mr. Hartley Shawcross: To what figures did these alterations relate?—On many occasions to many figures in the report.

Did the alterations ever relate to figures for calorific value?—Not in particular.

Did they eyer include them?—The alterations did sometimes include the calorific value figures.

Witness said in December, 1936, the figure for calorific value shown in the Crowlands stock book was 446·5, and in the draft report he inserted the figure 447. He passed that figure on to Mr. Clegg, and it was altered to 467. He would not swear whether the alteration was made by him or Mr. Clegg. If he made the alteration it was done on Mr. Clegg's instructions.

After evidence had been given by shorthand typists as to the typing and duplicating of the monthly reports, the hearing was adjourned till May 5.

Scottish Junior Gas Association

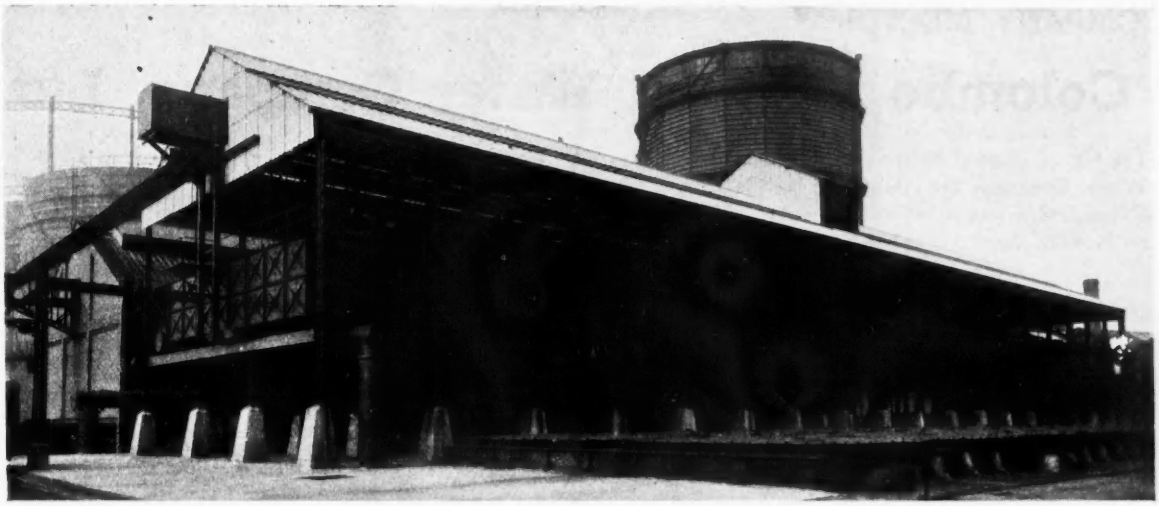
(Western District)

The Annual Business Meeting of the Scottish Junior Gas Association (Western District) was held at the Christian Institute, Bothwell Street, Glasgow, on March 25. The Council's Report and Balance-sheet were unanimously adopted, and the Office Bearers for Session 1939-40 were elected as follows:

President.—E. G. Smith (Dumbarton).
Vice-President.—W. Kirk (Motherwell).
Hon. Secretary and Treasurer.—T. Stirling (Kirkintilloch).
Council.—A. Shand (Falkirk), K. Graham (Glasgow), L. A. Nicol (Greenock), and A. MacFadyen (Dumbarton), who retire Session, 1941; together with N. C. Sturrock (Greenock, *ex-officio*), G. Croll (Alexandria), J. Bateman (Kilmarnock), F. Edgecombe (Ardrossan), C. Campbell (Glasgow), and W. Sheach (Beith), who retire Session, 1940.
Hon. Auditors.—F. Hailstones (Glasgow) and J. Greig (Glasgow).

Mr. E. G. Smith expressed his thanks to the members for his election to the Presidency of the Association and said it would be his constant endeavour to assist the Association in every way possible.

An Address, illustrated by lantern slides, was then given by Mr. W. M. Dick, of the Stanton Ironworks Company, Ltd., on the subject of "Spun-Iron Pipes and Reinforced Spun-Concrete Lamp Columns." This, together with a report of the discussion which followed, will be dealt with in a subsequent issue of the "JOURNAL."



General View of New Plant No. 1 Section in Foreground

Extension of Purification Plant at Etruria Works, Stoke-on-Trent

EXTENSION of purification plant at the Etruria Works was imperative in order to cope with the increasing output experienced during the past few years. Since 1933, the quantity of gas delivered has increased from 1,782 million cu.ft. per annum to the current figure of 3,180 million, which is equal to an increased output of 1,398 million cu.ft. over a period of six years. The new installation of purifiers was brought into operation on Feb. 14 last.

THE existing purification plant, prior to enlargement, consisted of one set of 7 boxes, 40 ft. by 35 ft. by 6 ft. deep, at ground level, erected in 1904. A further set was constructed in 1926, and comprised six boxes, 50 ft. by 30 ft. by 8 ft. deep, elevated for bottom discharge. The combined capacity of these two installations was equal to 11,200,000 cu.ft. per day. The rated capacity of the new extension is equal to dealing with 8 million cu.ft. per day, thus bringing the total daily capacity up to over 19 million, which, it is anticipated, will meet the Department's requirements for some years ahead. The scheme also included an increase in the station meter capacity (which was operating at a considerable overload), and this work included the replacement of a wet station meter 2,400,000 cu.ft. per day by a 7,800,000 cu.ft. per day Connersville meter, arranged with connexions for future extension. The nominal present rated capacity of the station meters is now 16 million per day.

The foundations for the new purifier installation consist of 76 reinforced concrete piers, with bases 5 ft. and 4 ft. 6 in. square, taken to depths varying between 11 ft. and 14 ft., according to the nature of the ground. The maximum load on foundations was based on 1·5 tons per sq.ft.

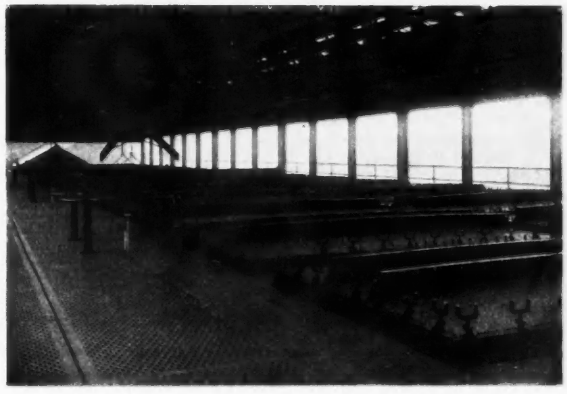
The purifier boxes are elevated to a height of 12 ft. from ground level to the underside of the main cross girders, and are arranged in line and consist of six boxes of the luteless type, being supported by 76 stanchions, the outer stanchions being extended to carry the roof structure.

The boxes are built up with ¾ in. thick cast-iron plates, 5 ft. square to the bottom, with the side, end, and division plates in two tiers, 5 ft. by 4 ft. Five lines of transverse tee bars of 1¼ in. diameter bars, also designed in two tiers for each box, form the stiffeners for the side, end, and division plates. Suitable cast-iron bearers are arranged for supporting three rows of grids.

Each purifier is complete with six purifier covers formed of ¼ in. steel plate, of all-welded construction, with 6 in. by 4 in. by ½ in. steel angle curb, and stiffened with two 10 in. by 3½ in. steel channels. The joint between the cover and the purifier is of the "Bearscot" improved principle.

All valves and connexions throughout are 30 in. diameter, the boxes being operated by 12 double-seated disc valves, the discs being of the rotating type for cleaning the valve seatings. Each box is fitted with two-unit reversing valves for the alteration of the flow from downward to upward.

The oxide handling plant is capable of dealing with 40 tons per hour, the elevator being situated mid-way along the line of boxes, delivering oxide to a 24 in. wide belt conveyor capable of travers-



View at Purifier Level

ing the full length of the purifiers for feeding the boxes, and also for delivering spent oxide to the chute fixed at the end of the superstructure for loading railway trucks.

The Contractors for the foundations were the F. C. Construction Company, Ltd., for the purifiers, &c., Messrs. R. & J. Dempster, Ltd., Manchester, and for the Connersville meter, Messrs. W. C. Holmes & Co., Ltd.

COMPANY MEETING

Colombo Gas and Water Company, Ltd.

The Annual General Meeting of the Colombo Gas and Water Company, Ltd., was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C. 2, on Monday, April 17, 1939—Mr. ROBERT H. GLEN, F.C.A. (Chairman), presiding.

The ASSISTANT SECRETARY (Mr. F. W. Edwards) read the notice convening the Meeting and the Auditor's Report.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said: A copy of the Report and Statement of Accounts, having been sent to all members, I will ask you to take them as read.

I will, as usual, preface my remarks on the Accounts with a few comments on the general state of affairs in Ceylon. The year 1938 was not a good year for trade. Tea prices decreased but larger quantities exported rather more than counter-balanced this. Rubber, however, fared badly and both quantity exported and average price realized was lower than in 1937. The third main export industry, coconut products, was also depressed. Total exports from the Island fell by 14% and imports also decreased slightly. When trade in Ceylon is poor, business becomes more difficult for us, and this year we have to report a reduced amount of gas sold.

The climate of the Island can also handicap us to some extent. For instance, there was exceptional rainfall in April. The estates were prevented from using our tar, and our sales of that product showed an appreciable decrease that month. Then, in November, a period of drought caused an acute water shortage in Colombo, affecting the use of geysers. The number of geysers in use increases steadily, and any restrictions in water supply means loss in business.

Referring now to the accounts before you, you will see a small addition to freehold land works and plant, of £186 0s. 3d., representing new mains less depreciation for motor vehicles.

The figures in the Revenue Account call for a general explanation before the details are commented upon. There are some big differences in some of the items as compared with the previous year's figures and these arise from alterations in our accountancy system. Principally, the changes affect wages which, instead of being all in one account, are now allocated to the heading under which the labour is employed.

Coal carbonized cost Rs. 8,206 more than in 1937, although less coal was used. Contracts were made for our coal supplies at not unfavourable rates, but heavy freights on the individual shipments put up our landed costs.

Under the heading working expenses, wages and salaries now represents manufacturing wages only, *plus* management salaries. The maintenance of works figure of Rs. 89,038, as compared with Rs. 32,371 the previous year, includes wages and also the cost of re-sheeting and overhauling our No. 3 gasholder, which heavy expense will not recur this year. Trade and general charges, up by Rs. 4,702, now includes some wages. The total working expenses are Rs. 299,266, as compared with Rs. 300,278. Wages for fitting work at Rs. 15,341 is Rs. 1,831 less than in the previous year. Legal Expenses are down by Rs. 307, but bad debts increased from Rs. 362 to Rs. 702. The 1936 figure, however, was Rs. 941.

Depreciation of stock and motor vehicles is Rs. 56,602, as compared with Rs. 50,595, the difference representing increased writing down of fittings on hire and general stock.

Cooker fixing and repairs Rs. 59,552 compares with two headings in the previous year's accounts—viz., fixing cookers Rs. 22,551, and maintenance of cookers Rs. 30,522, and the 1938 figure also includes wages. Geyser fixing and repairs Rs. 12,916, is Rs. 480 less than the corresponding item in 1937. Meter fixing and repairs is now shown separately, and the figure Rs. 21,334 includes wages and materials.

Showrooms cost a little less than the previous year at Rs. 10,757, while bonus to staff and workmen based on the profit made, is a trifle more at Rs. 21,694.

Ceylon income-tax is Rs. 20,869, or Rs. 9,041 more than in 1937. The rate of tax on non-resident companies has been increased from 12% to 15%, but we obtain Dominion income-tax relief in London, and this is passed on to shareholders when deducting income-tax from the dividends.

On the credit side of the Account, gas rentals increased from Rs. 678,643 to Rs. 698,055. This reflects the increase in the price of gas as from July 1, 1937, to which I referred last year. Our total gas sold was 3·29% less than the previous year.

We have recently obtained the order, after prolonged negotiations, for a gas-fired crematorium furnace, and we hope to see an appreciable increase in the Municipal Council's consumption. Special efforts are continually being made to increase sales and we held a successful series of cookery demonstrations last summer in our showrooms. A European chef was engaged and lectures were given in English, Sinhalese, and Tamil. The results were gratifying and warranted further similar ventures.

Meter rentals at Rs. 23,153 are Rs. 1,054 less than the previous year. The sales of residual products increased from Rs. 182,900 to Rs. 199,098. Sales have been quite satisfactory, although the weather has affected them slightly. Gas fittings is Rs. 69,582, or Rs. 613 more than in 1937.

In the General Balance-Sheet, you will see our Reserve, Exchange Reserve, and Depreciation Accounts are all unaltered and together total £100,525, £44,910, of which is represented by investments shown among our Assets.

I feel that the Report and Accounts can be considered very satisfactory, considering the difficulties we have had to meet. We have lost some lighting, but our public lighting contracts with the Colombo Municipality and the Dehiwela Council were renewed for a further year on the same terms. The Municipality itself is increasing the use of gas. A gas-fired incinerator was installed during the year for them and we now have in hand the order for the crematorium furnace previously mentioned. As regards appliances in use, the last reported figures show very satisfactory increases in cookers, geysers, refrigerators, &c., over the figures at Jan. 1, 1938.

I now have pleasure in moving that the Report and Accounts be received and adopted.

The Report and Accounts were adopted and a resolution passed declaring a dividend of 10% per annum less income-tax on the ordinary shares and 7% per annum less income-tax on the preference shares, both less interim dividend paid Oct. 11, 1938.

Mr. Alex. A. Johnston was re-elected as a Director and Mr. William Cash, Junior, F.C.A., was re-elected as Auditor.

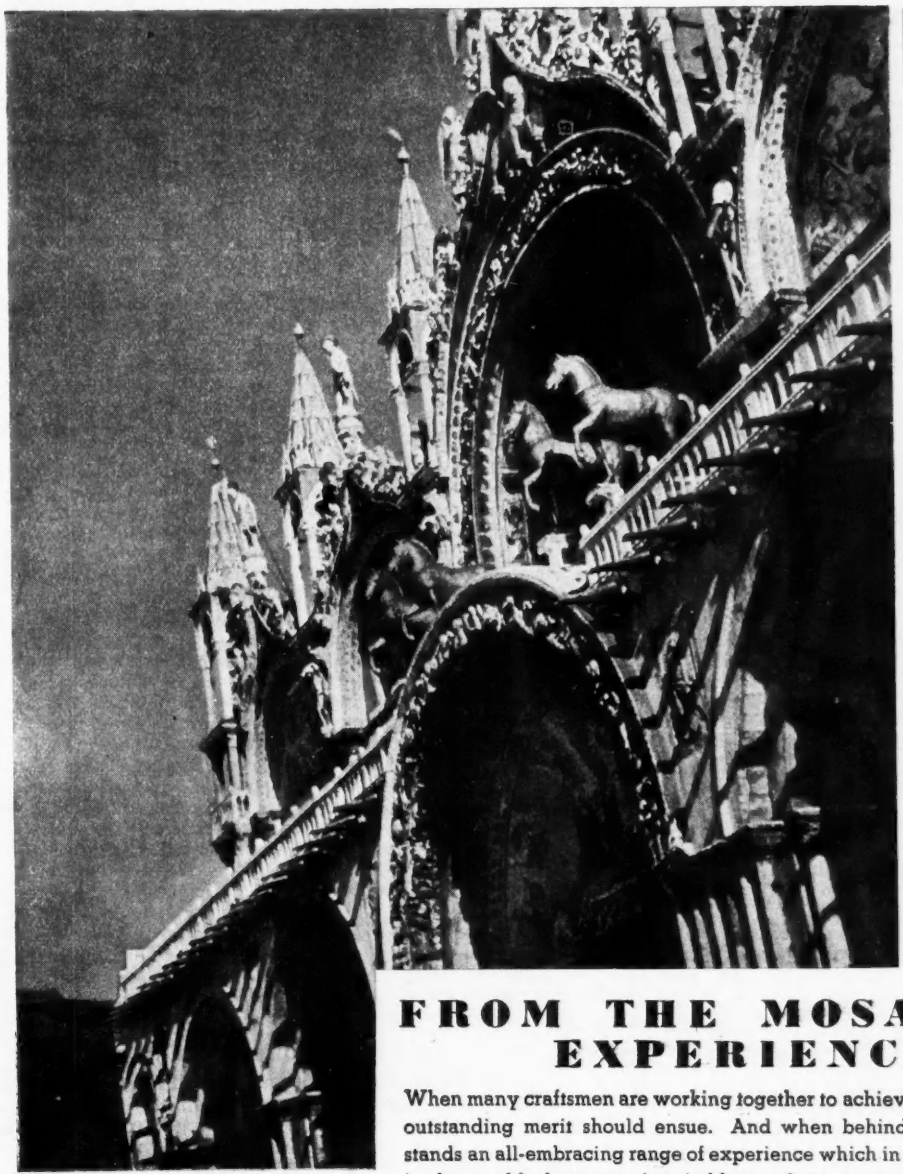
Gas Undertakings' Results

Bombay.

The quantity of gas sold by the Bombay Gas Company, Ltd. (an extended report of the proceedings at the annual general meeting of which will appear in next week's issue of the "JOURNAL"), during the twelve months ended Dec. 31 last was 595¾ million cu.ft., and the total receipts on Revenue Account amounted to £166,153. The expenditure was £141,824, leaving a balance of £24,329 to be carried to Net Revenue Account. This sum, together with the profit on exchange of £6,179, and the balance of £46,364 brought forward from the previous year, makes a total of £76,872. After providing for the payment of interest, the interim dividend of 3½% (less income-tax) paid in November last, the addition of £2,684 to the Reserve Fund and £533 to the Renewal and Contingency Fund, £1,046 for Depreciation of Investments, and £2,086 for Exchange Equalization Reserve Fund, there remains a balance of £59,146. The payment of a dividend of 4½% (less income-tax), making 8% for the year, will leave £45,646 to be carried forward to the current year.

Bridgwater.

The business of the Bridgwater Gas Light Company continues to show progress. The quantity of gas sold in the past year was 166,334,100 cu.ft., or 748,503 therms, which compares with 165,414,500 cu.ft., or 144,365 therms, in 1937. Mr. W. H. Bennett, who presided for the first time at the annual general meeting of the Company, expressed appreciation of the work done by the Chairman and Directors before the undertaking became connected with Associated Gas and Water Undertakings, Ltd., in September last. A dividend for the year of 7½% leaves a balance of £8,068 to be carried forward to the next year's accounts. The Chairman pointed out that on the Profit and Loss Account profits were shown to be somewhat less, but sufficient to declare the usual final dividend, leaving a sum slightly less than last year to carry forward. A contract has been entered into for the erection of new carbonizing plant, and the work is well advanced. The Capital Account shows an expenditure during the year of £3,064, mostly on mains and new meters. During the year £19,601 of 4% redeemable preference stock was issued, and there is a balance at credit of Capital Account amounting to £8,364.



FROM THE MOSAIC OF EXPERIENCE

When many craftsmen are working together to achieve one end, a work of outstanding merit should ensue. And when behind their united efforts stands an all-embracing range of experience which in its field is unrivalled in the world, then must inevitably result a masterpiece which few can approach and none surpass. It is to the mosaic of experience—built up piece by piece from the research and steady application of many specialists—that the Woodall-Duckham Company turn for the solution of every problem as it arises. They know that experience is the only sure basis of good plant design. They know that "rare inspiration" and so-called "accidental discovery" must be checked against the knowledge that only experience can give. The knowledge gained in thirty-five years' experience in the design, construction and operation of 375 carbonising plants is at your disposal.

(The illustration shows some of the mosaics at St. Mark's, Venice.)

THE WOODALL-DUCKHAM VERTICAL RETORT & OVEN CONSTRUCTION CO. (1920) LTD.
EBURY HOUSE, 150 VICTORIA STREET, LONDON, S.W.1
TELEPHONE: VICTORIA 8631 (6 LINES) Members of the Society of British Gas Industries TELEGRAMS: "RETORTICAL, SOWEST, LONDON"

T.G.S.

Coke from the Production Side

By
G. DOUGILL, M.Sc., A.I.C.,
of the Gas Light and Coke Company.

From a Paper to the London and Counties Coke Salesmen's Circle on March 15—the Chairman (Mr. R. Summerson, of Luton), presiding.

The Author, having considered the coal, the carbonizing process, and the plant employed, described how these factors can be applied in the control of coke quality.

It is not easy, he said, to lay down hard and fast rules as to the effect of the type of plant on the coke produced. So many other factors act simultaneously either to magnify or to minimize the general tendency of the plant that it is dangerous to generalize. Certain factors are, of course, fairly definite. For instance, hard metallurgical coke can be more readily made in a coke oven, whereas a softer domestic coke is easier to make in continuous vertical retorts; coke from horizontal retorts and intermittent verticals generally tends to be of less reactivity, but these are only general statements. Local conditions, the coal used, blending if practised, temperatures of retorts, and period of carbonization may all render these statements inaccurate. It is also important to remember that it is not possible to make the large coke of the hard, metallurgical type, which is most efficient for larger plants, and the broken coke and nuts of high reactivity suitable for domestic work.

For laundries, steam boilers, and industrial furnaces, the hard, metallurgical type of coke as produced in coke ovens is generally favoured. At the other extreme is the open domestic fire, which requires a fuel that will ignite easily and burn with little chimney draught. Between these two extremes are an infinite number of varied demands.

The factors which are available to control the coke quality have been carefully investigated and may be summarized as follows:

For increased reactivity:

Lower temperature of carbonization;
Shortening the carbonizing period;
Carbonizing in thin layers;
Blending with partially carbonized coal,
or, certain non-coking or weakly coking coals,
or, finely ground breeze.

For harder coke:

High-temperature carbonization;
Thicker layers of coal;
Longer periods of carbonization;
Blending with strongly coking coals with lower per cent. volatile matter.

Although these methods are available, one cannot proceed to put them into action commercially without considering the consequences in other directions, and it may be useful to discuss these in turn.

Lowering the temperature of carbonization has many serious drawbacks when applied in ordinary gas-works plant. The heat necessary to raise the coal to its temperature of carbonization is caused to flow by the difference in temperature between the retort and the charge. When this temperature difference is reduced to any considerable extent the rate of heat flow and hence the rate of carbonization is reduced, involving the use of larger plant and hence increased capital costs. In addition, the yield of gaseous therms per ton is decreased, entailing increased coal charges. For low-temperature carbonization, therefore, special plant is required, which is designed for these particular circumstances, and produces low gas yields of high calorific value and tar and benzole of quite different character.

Shortening the period of carbonization is not quite so drastic in its effect on gas manufacture. The aim is to avoid heating the coke for long periods after carbonization is complete. This after-heating has been shown to be very detrimental to those properties which favour its use in open fires.

Owing to fluctuations in the demand for gas it is not possible to maintain the period of carbonization constant, but from the coke point of view it is preferable to meet a suddenly reduced demand for gas by putting some settings on slow fires and maintaining normal work on the rest, rather than by drastically lengthening the period during which the coke is left in the retort.

Quite appreciable reductions in the period of carbonization can be made without reducing the gas output per unit of plant and without seriously reducing the therm output of gas per ton, and much investigation has been carried out in this direction. Obviously great care has to be taken to avoid the production of a partly carbonized core, which is soft and friable, and would cause considerable breakdown to breeze at each stage of handling.

This factor is, of course, bound up with the third factor mentioned—namely, carbonization in thin layers. Thin layers cannot be employed in existing plant, since the free space above the charge would cause cracking of the tar and gases producing free carbon, naphthalene, and hence blocked ascension pipes and pitched mains. Special plant would be required, involving increased capital costs and running charges. Steaming of the charge also appears to have a favourable effect upon the reactivity, and is, of course, practised on most continuous vertical plants and some horizontals.

The last factor, "blending," has been the subject of much investigation, and the results that can be obtained are fairly well known. The three most favoured blends are with partially coked coal, with selected non-coking or weakly coking coals, and with finely ground breeze. Work is still proceeding, but whether blending is a commercial proposition after all allowances have been made for additional costs, reduced yields, &c., is still to be decided.

For improved shatter test and harder coke the opposite to the above conditions is generally desired—*i.e.*, the carbonization of thicker layers of coal at high temperature with long periods of carbonization. Blending is also of use, though usually with strongly coking coals of lower volatile matter than ordinary gas coals. Breeze blending under these different conditions also appears to have some advantages. Gas output per unit of plant and gas yield per ton of coal are usually favoured by these conditions.

Many Aspects to be Considered.

Considering these factors together it will be seen that there are many aspects to be considered. In the published accounts of gas undertakings it is customary to charge all costs of carbonization against the gas, with the result that any alteration in the system of carbonization which reduces gas output per ton of coal, or per unit of plant, increases the cost per therm. Gas, however, has to be sold in open competition with all other forms of fuel, and its costs must be kept at an economic level which is not necessarily controlled by costs but by what it is worth to the consumer. Any process of improving coke must therefore produce tangible benefits which will carry all the increased costs which it entails.

Another complication arises from the fact that, generally speaking, the different sizes of coke are desired in differing qualities. For instance, large coke is wanted of high shatter test and low reactivity, as it is used mainly on furnaces. Broken coke, however, is largely used for open fires, and should have high reactivity and be easily ignited, and the smaller sizes may be wanted for either forge coke or small domestic boilers. If two qualities of coke were made it would involve finding an outlet for the smaller sizes of the hard coke, and also the large sizes of the reactive coke would have to be cut, with the consequent production of a further proportion of breeze.

The problem is, therefore, a large one. Great strides have been made, such as the general reduction in ash by coal cleaning, reduction of excess moisture by carefully controlled quenching, greatly improved grading, and the maintenance of regularity in quality. Research work has also developed methods of testing which indicate the qualities of coke and

assist the producers in the maintenance of this regularity, but, of course, more remains to be done.

The complexity of the problem indicates that just as one type of coal will not suit all consumers, so any one solution to the coke problem will not be universally applicable; and it is imperative, therefore, that producers, sellers, consumers, and investigators should keep in close contact so that the progress already made can be maintained and accelerated.

Discussion.

It was observed that Mr. Dougill had dealt with the first principles of carbonization practice, and there were certain questions on which disagreement was expressed with the Author. Mr. Dougill might have told them more about the influence of temperature on the physical characteristics of coke. He had mentioned certain working temperatures for ordinary practice, together with the optimum results but he had not told them what would happen if they carbonized at 600° or 900° C.—nor told them very much about low-temperature coke. If he came in contact with coke selling he would know that low-temperature coke was one of their most serious competitors. Mr. Dougill had over-emphasized the static forms of carbonization, whereas many undertakings were carbonizing in continuous vertical retorts. They all on occasions came up against the consumer who maintained that coke oven coke was much better than gas coke. They would like to hear from Mr. Dougill the difference between oven coke and gas coke. No one could have described in simpler or more illuminating language the physics of coal carbonization. Moreover, that was their starting point, and if they were quite clear in regard to the fundamental principles of carbonization other points could be arrived at by deduction. They had not been told very much about moisture in coke; they would all like to know more about that. It had been stated that, within limits, a certain amount of moisture in coke was desirable. In fact, they had experience of bone dry coke which would not ignite or burn. Perhaps Mr. Dougill would tell them what were the reasonable limits and the anticipated proportion of moisture in a saleable coke. Mr. Dougill had only taken them as far as the half-way house; they had made their coke, but many a good product was marred by its finish. The whole question of quenching, conveying, elevating, screening, and grading was a fundamental feature of coke production which, while outside the scope of the Paper, was just as important and necessary.

Mr. Dougill observed that he had only given a very brief *résumé* of what he had set out more clearly in the written Paper. He had endeavoured to show mainly the physics and fundamental principles on which the whole subject was based. The question of the subsequent treatment of the coke was best left to a subsequent lecture. In dealing with the factors which controlled the quality of the coke, he had tried to make it clear that, the quicker carbonization was effected and the shorter the period during which the coke was subject to high-temperature, the greater its suitability for the domestic market. For metallurgical purposes the reverse was the case and the coke produced in coke ovens, with its high shatter test and low reactivity and large pieces, was better. Those were the two extremes—and between these two extremes came intermittent verticals and horizontals, which had great flexibility, and, by temperature control and choice of suitable coals, could produce coke approaching either type. They must study the balance-sheet of the many processes before deciding which was most suitable. He could not agree that any one plant was only suitable for producing any one type of coke. In France, for instance, he understood that they were producing very good domestic coke in coke ovens. Horizontal retorts would carbonize almost any type of coal and would produce a very wide range of coke qualities which could be suited to the market available.

With regard to temperatures, only within small limits could one reduce the temperature in a modern plant. If one reduced it further, it called for a special design of plant to overcome the difficulties of low heat flow involved in low temperature plants. This Paper was restricted to the normal type of gas-works plants. It did not make much difference to drop the temperature 50°; they would probably get an equivalent result by pushing the retort half-an-hour earlier. He had tried to enumerate guiding principles rather than lay down hard and fast rules which could only apply to one set of conditions. With regard to the limit of residuary volatile matter, they could not shorten the period of carbonization further than the period which was necessary just to carbonize the core of the charge, or they would get pitchy and half carbonized matter in the centre of the retort, resulting in a highly reactive smoky product with less reactive matter round it. Shortening the carbonizing period limited the period during which the coke was heated in contact with the hydrocarbon gases, so that carbonization in thin layers produced small reactive coke whereas bulk carbonization produced a greater proportion of large coke, since they were carbonizing for a longer period and tending to get a less reactive coke. There was no comparison between coke ovens and continuous vertical retorts; they were the two extremes. Continuous verticals were perhaps specially useful for medium and small works, whereas coke ovens were only suitable in large units. The single unit at Beckton used 1,000 tons of coal a day, and they found there was a good demand for oven coke.

As regards moisture, went on Mr. Dougill, reasonably dry coke was desirable, and, although some consumers actually added water to their deliveries, he had never been able to trace any effect on combustibility. The moisture content of coke should be kept down to reasonable limits, such as 2% to 5%, though it was very difficult to keep down the moisture content of breeze. In the larger sizes, however, it was kept down to a very low figure.

Another Member referred to pushing out the charges from horizontal retorts when just carbonized, with the result that the lower primary yield was counterbalanced by increased combustibility of the coke; the throughput of the plant was also slightly increased thereby. If they wanted to work to the same principle with continuous verticals, they withdrew at the point when the coke came out "smelly." But it was difficult to decide exactly when the plastic core was just burnt through; at that point they got the maximum reactivity. He asked if there was any better market for a highly reactive coke of low burning temperature than there was for oven coke. There was, he observed, a much greater potential market among domestic consumers than industrial.

Mr. Dougill said that it was not always easy to strike a balance carbonization, and other costs in respect of improving the coke carbonization and other costs in respect of improving the coke for the market had to be met by increased revenue from the coke; and while there may be some badly over-carbonized coke on the market, there was probably less trouble now in this respect where settings were controlled to correct temperatures by continuous pyrometer readings. In their own case they had four or five people continuously going round reading temperatures. By temperature control and an exact schedule of discharging retorts great improvement in the coke had been obtained. By attempting to get considerably enhanced reactivity they were liable to get an uncarbonized core, which was very detrimental.

Blending.

Reference was made to the difficulties of blending in the average plant. At Beckton they were fortunately placed in that they were blending the coal for the ovens. The process of blending was explained and the need for pulverizing the coal stressed. The Chairman, however, disagreed as to the necessity for pulverizing, remarking that they could blend in nut form. An unreactive coal blended with a reactive coal, reproduced the same characteristic in the resulting coke, and the reactive portions ignited the unreactive portions.

Awkward questions raised by consumers could often be answered by knowledge of the production processes. In an undertaking where they offered one class of coke only, they had lost none of their industrial load as a result. The chief difficulty was producing coke large enough for their industrial consumers, which called for great care in handling. In order that consumers might continue to have the class of coke to which they were accustomed, the undertaking recently had had to buy coke in considerable quantities for works purposes—which showed a proper appreciation on the part of Engineers of the value of the coke market.

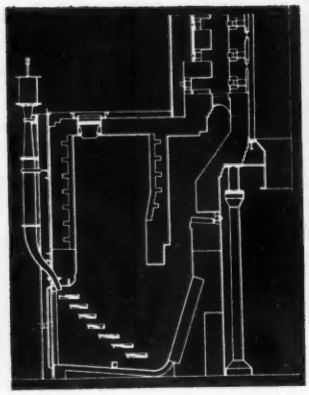
Mr. Dougill said that there was a big advantage in selling only one class of coke (provided the district was not subject to competition from other classes imported from other districts) as regularity could be maintained.

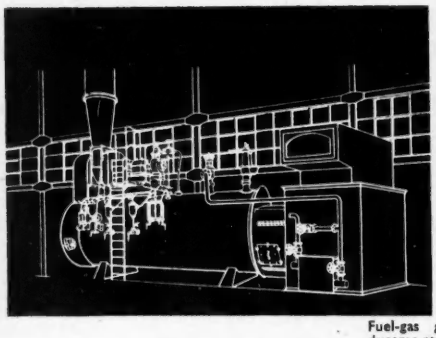
The question of the suitability of intermittent vertical coke for the open grate was raised, it being suggested that there must be something in the quality of the ash. Although it was desirable to have a low ash content, some lots of coke with a high ash content, instead of having a detrimental effect, appeared to be very active on the hearth. Mr. Dougill was asked whether he considered the presence of ash had any effect on the combustion of coke from a catalytic viewpoint; and, if so, would it be possible to produce intermittent vertical coke with that quality, yet retaining its dense nature so as to make it suitable for both domestic and industrial use. Surprise was expressed at the Author's reference to the "undesirable crackle" in coke; it was so often regarded as a desirable feature.

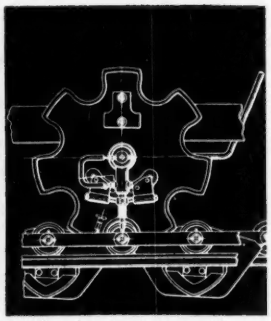
Mr. Dougill said that considerable work had been done by way of adding inorganic substances to produce additional reactivity, but so far only two had been found satisfactory—namely sodium carbonate and lime. The mechanism of the reaction was not known, but it might be that the sodium carbonate decomposed at the right moment and produced pores in the coke. The difficulty of using lime and soda was that they were alkaline, and liable to damage the silica of the retort. There was no doubt that there were possibilities of improving the quality of coke by such means, but they involved addition to the ash content. It was possible, though not likely, that ash on the surface of the coke might assist combustion. He was interested to hear that some customers found that the crackle in coke was attractive. If necessary it could be obviated by dry-quenching.

The meeting terminated with a hearty vote of thanks to Mr. Dougill for his Paper on the proposition of the **Chairman**, seconded by **Mr. R. C. Minnion** (Gas Light and Coke).

Modern DESIGN... MODERN EQUIPMENT

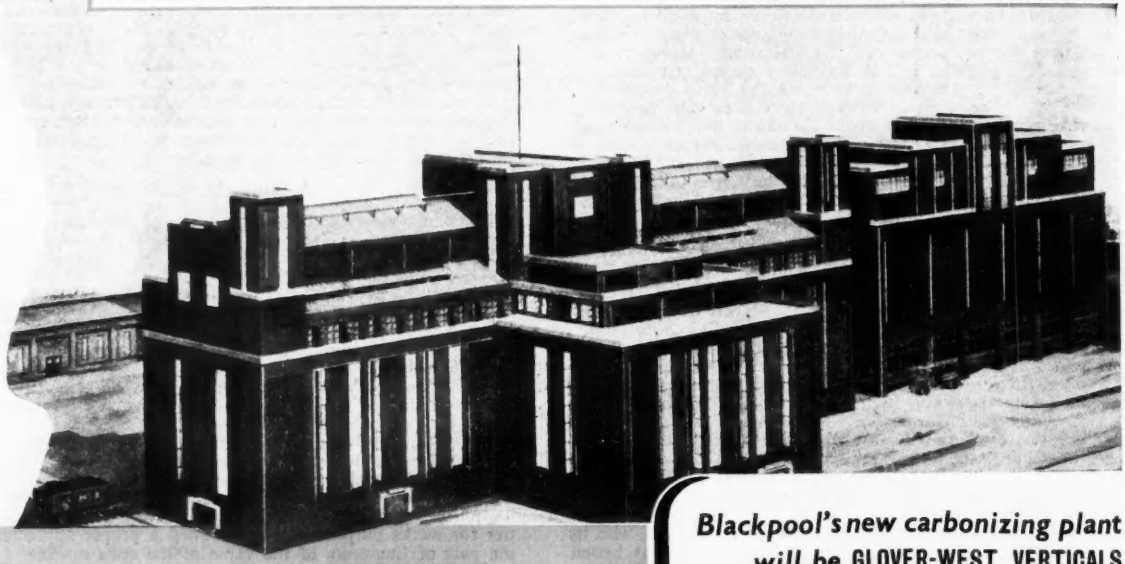






FOR THE RETORT HOUSE

Fuel-gas generation in pressure-operated producers; steam-raising by waste-heat recovery; and automatic force-feed lubrication applied to coal and coke conveyors are amongst the standard features of the modern Glover-West vertical retort installation.



WEST'S

CARBONIZING PLANTS

Blackpool's new carbonizing plant will be GLOVER-WEST VERTICALS

WORK is proceeding on a 72-retort installation of Glover-West vertical retorts at the new Marton gas works for the Blackpool Corporation Gas Department. The plant will be equipped with pressure type producers, waste-heat boilers, dust extraction and air-conditioning plants, together with extensive coaling equipment and coke handling, cutting, grading and de-dusting units. The drawing shows the architectural design of the retort house and coke plant.

WEST'S
GAS IMPROVEMENT
CO · LTD

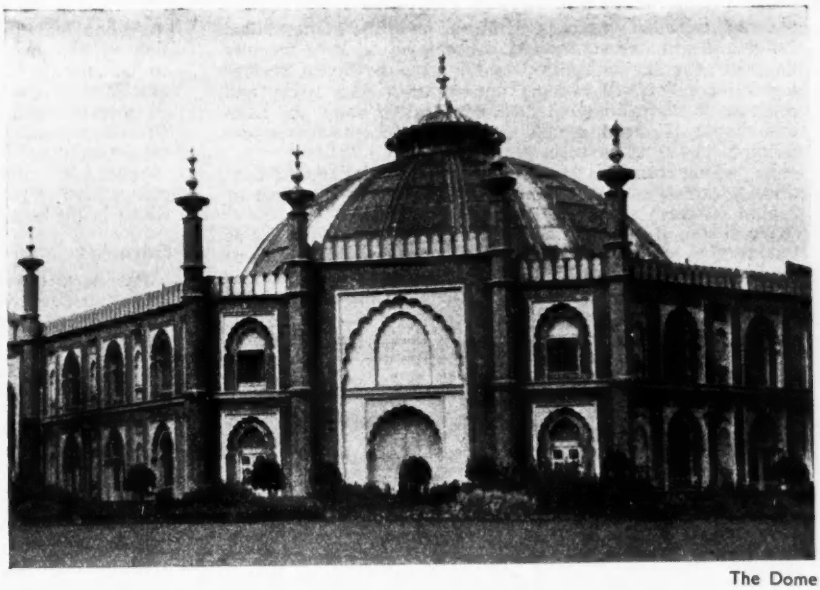
Miles Platting · Manchester 10

Telephone · Collyhurst 2961 Telegrams · Stoker, Manchester

Glover-West Vertical Retorts · Westvertical Carbonizing Chambers

435 INSTALLATIONS BUILT OR ORDERED IN 24 COUNTRIES

FROM April 22 to 25 the 27th Annual Conference of the British Commercial Gas Association was held at Brighton under the Presidency of Mr. A. M. Paddon (Chairman of the Brighton Hove and Worthing Gas Company). The Business Sessions of the Conference were held at the Dome, and in the following pages we give the Presidential Address and other Papers, together with reports of proceedings.



The Dome

B. C. G. A.

CONFERENCE at BRIGHTON

Presidential Address

BY

Mr. A. M. PADDON, M.Inst.C.E.

(Chairman of the Brighton Hove and Worthing Gas Company)

WHILE I cannot congratulate you on your choice of a President, I may hope that, in that regard, you may find some compensation in your selection of this not unattractive town of Brighton for the purposes of your Congress.

As one approaching the end of a long association with the Gas Industry, I am without any perspective, and am limited to retrospect and reminiscence in the attempt to interest you.

Reverting to the earlier legislation of the Industry, one's attention is arrested by the Gas Works Clauses Act of 1847, which (with its later complement, that of 1871) forms, even now, the mainspring of the statutory and enabling powers of the Industry, and constrained to recognize the prescience and intelligence with which, barely twenty years after the birth of the Industry, such valuable provisions were enacted.

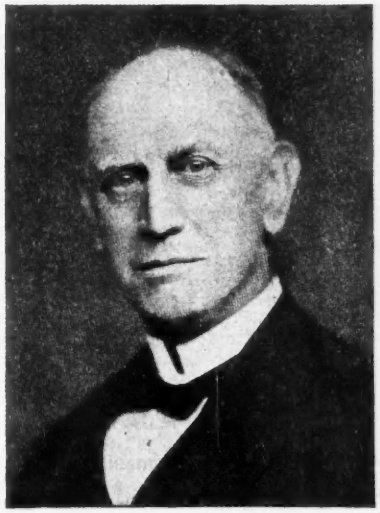
The facilities furnished are often taken as a matter of course, and powers and privileges read into the actual text which are more matters of implication than specific enactment.

It seems to me, and the late Mr. Tyldesley-Jones expressed a similar view, that Sections 22 and 23 of the 1847 Act call for rather closer study than is ordinarily the case.

The view has frequently been ventilated of late years that the Gas Industry has suffered, and even to-day still supports, the disability of restrictive legislation. This must necessarily be so in certain cases, but I am strongly of opinion that such instances are better dealt with by private legislation as applicable to exceptional circumstances, rather than by a disturbance of the general law, which brings with it new responsibilities, when such are undesirable. Hard cases make bad law.

Within the orbit of my recollection, Statutory Gas Undertakings have been practically in these categories: Maximum dividends, sliding scale, and basic price. Some companies still adhere to the earlier type of maximum dividends, and I believe this system was far too hurriedly discarded, in general practice, for the later sliding scale principle. It is true that the former method lacked a certain speculative element so attractive to a certain order of investors; and also inferred a specious regard for the consumer, but it sacrificed in some degree stability and security. Furthermore, its administration required (if its principle were completely implemented) the synchronism of two exacting duties, the lowering of the price of gas and the increase of dividends.

In practice, these processes have been dissociated, in, I might almost say, the preponderance of cases; but it would appear that the simultaneous operation was contemplated.



The President.

With respect to the basic price, this is of such comparatively recent adoption that its qualities are hardly ripe for consideration; but the security of the initial 5% to the proprietor is an obvious advantage. This system connects itself in certain cases with administration of co-partnership, and in so doing confers a statutory right to the ingredient amount so derived.

Now this differs from appropriation of such benefits under those applications of the co-partnership principle, where such allocations are a gratuitous gift from the proprietors to the recipients, and the sentiment engendered is of a totally different description. This divergence should be considered and appraised.

Before leaving the subject of legislation, I would refer to the protective enactments with reference to the exclusion of the use of gas in municipally-provided dwellings. In very many cases this disqualification never arose, and

although, in other instances, as in our own, the matter called for adjustment, the equity and policy involved have recently been so generally recognized that it is to be hoped further legislative relief will become unnecessary. The policy and practice of that all-important administrative body, the London County Council, should finally influence and even determine the issues in case.

In passing from this brief reference to legislation, the continuous extension of the enabling powers as to the issue of capital is worth attention.

Up to some forty years ago the limit of loan capital was as low as 25% of the issue of ordinary capital, and it has crept gradually upward until, under the Gas Undertakings Act of 1929, 100%, or the equivalent, of the total ordinary capital issued can be raised as loan capital.

When one encounters so frequently to-day the authorization to issue new capital as "partly preference," or "entirely preference," it suggests some speculation as to whether the issue of simply "ordinary" capital is not in some degree embarrassed and prejudiced by the licence that has been accorded in this regard.

Technical.

The technical progress of the Industry has been reflected in the development of the manufacturing processes in the works of this Company; but in a considerably retarded method.

Until after the Great War the carbonizing plant employed at our works was that of directly fired retorts, without charging stages or any considerable adoption of the regenerative systems.

The results over a series of years were as follows:

Make per ton 12,600 cu.ft. of 15-candle gas, and over 12 cwt. of coke and breeze per ton, and a realized sale of between 10 cwt. and 10½ cwt. per ton, with 10 gallons of tar.

Figures not in themselves impressive until associated with the capital employed in providing the plant producing them.

The retorts employed were 15 in. and 18 in. round, 20 ft. through, in settings of eight, and the total cost of the complete retort house equipment, excluding the bare and naked cost of the building containing it, was £26 per mouthpiece, or £52 per ton of coal carbonized per diem.

To-day, with normal and comparable contemporary working, as generally obtaining, the cost of the existing plant per mouthpiece is £150 to £170, and the cost per ton of coal carbonized per diem about £200; while the make of gas per square foot of retort house floor has been doubled.

In passing from the subject of carbonization there is a doubt, in view of the distension of dimensions, whether the term "retort" is applicable to its former subjective, as with retorts enlarged to 18 in. by 24 in. the term "oven" would seem to be the more descriptive (as in the case of certain earlier methods of 80 years ago) of the present development of the vertical chambers.

The production of benzole has become inseparable from any such problem of technical policy as it is, at least, possible that, as in France, this process may become obligatory on the Gas Industry as an element in National Defence. In such case the horizontal system would suggest itself as the more adaptable to this end, particularly when associated with a calorific standard certainly not in excess of 500 B.Th.U., not ignoring the somewhat fuller thermal and gaseous yield of the vertical system. Indeed, it seems to me that as affecting both the horizontal and vertical processes a lower calorific standard of, say, 475 would be the more economical, even taking into consideration the discount thus imposed upon the distributive capacity.

Advantages of C.W.G. Production.

As having been associated as a junior engineer with first construction of carburetted water gas in this country nearly fifty years ago at the Beckton Works of the Gas Light and Coke Company, the advantages of this method of manufacture are hardly likely to have been overlooked in the case of this undertaking, and from those early days it has always been a cardinal feature of technical policy here.

In these days this manufacturing method is so generally a matter of common knowledge that any reference to it in detail is superfluous, but as a matter of degree it is still doubtful if in all instances its full economic possibilities have been reduced into practice.

Although the former extent of its benefits has been qualified by the advanced prices of coke and oil, it would seem to be still the case that the most complete economy and efficiency in gas production cannot be attained without its co-operation and associated employment—over and above its effect in the reduction of storage and other such heavier capital expenditure.

Indeed the advanced price of oil with its assistance in the competitive sale of coke is not without a corresponding discount in the costs of coal gas manufacture.

Commercial.

Passing to the commercial character of the Industry, which fifty years ago was regarded as something remote and of doubtful legitimacy in its relation to the business of a gas undertaking, but which has now become a paramount element, its very importance and complexity makes it difficult to approach.

The distribution and sale of gas, to which in the past was assigned a fractional portion of the total capital and revenue expenditure, now claim something dangerously like 50% of such commitments in highly competitive areas of supply.

When the capital cost of appliances, showrooms, transport, to mention only a few such demands, in one direction, and maintenance, supervision, salesmanship, and publicity, as coterminous, is taken into account, a balance of relative importance, financially or otherwise, is not easy to strike.

The advent of the hire-purchase system, alone, is sufficient to derange former values and methods and even now many of the factors in this regard have not been reduced into definite terms.

The problems of salesmanship were novel to the Gas Industry, as compared to ordinary and general commercial practice and experience, and many of them were, and are, peculiar to the gas business and cannot be solved by a perfunctory adoption of conventional methods.

Gas cannot be sold with success, as patent medicines, confectionery, or cheap clothing are dealt with—although a contrary idea seems to obtain in certain quarters.

The salesman, by himself, is a problem. He must have a certain amount of technical knowledge but not to a degree to bemuse or bore the customer. He must possess the nebulous quality of acceptability to the customer. He may have too much of it and create subsequent dissatisfaction and trouble by what he has succeeded in selling.

One thing is clear, that after a capital investment and a revenue expenditure bordering on extravagance, the main purpose of a gas undertaking, which is to sell gas, may be defeated at the point of contact with the public, by the ineptitude or incompetence or inadvertence of a salesman, from whom, if only by reason of his remuneration, much is not to be expected.

Importance of Temperament and Character.

Here is, indeed, perplexity, but I suggest it can be qualified in the first place by giving precedence, in selection, to the natural qualities of the employee, intelligence, congenial manners, agreeable personality, aptitude, industry, and the like, and until the best material in this way is obtained not to superadd such technical and commercial training as may be called for; in other words, to make temperament and character the first and most important qualifications. Further, by a closer supervision and control of the conduct and results of showrooms.

In the case of the larger undertakings by systematic and continuous inspection by a sales manager, in the smaller by frequent supervision by the general management. Showrooms, I believe, are frequently left to run themselves.

Again, by paying commission on results as additional to a reasonable living wage, either to individual salesmen, or on the aggregated transactions of each showroom.

An occasional and temporary assumption of control of a showroom by independent experts, with recorded results, will afford much useful information and guidance.

Advertisement has now an importance unheard of in earlier days; but whether it wholly or consistently attains its purpose is questionable. Very much of the current matter and method, illustrated and otherwise, whether considered from an artistic or purely commercial point of view, is entirely admirable, and much of it, beautifully reproduced, goes straight as an appeal to domestic and industrial interest; but some

other instances I have felt obliged to take exception to, to the extent of inhibiting any use of them where I had any responsibility.

Bad taste, without the saving grace of intelligence, will never inspire any legitimate interest; more particularly if connected with an Industry responsible for the satisfaction of a great and essential national requirement, and doing so with statutory recognition.

It might, perhaps, help the Industry in approaching the public to resolve into its most terse and recognizable definition what it has to offer that the public will accept as indispensable, and I think that primary and paramount commodity is NAKED FLAME, dissociated from the smoke, dust, impurity, and dirt with the dreary residuum of ash and cinder otherwise associated with its provision; and a further dispensation from the toil, tedium, and time involved in its production by other methods.

Can there be conceived any condition of civilized existence from which FLAME has been divorced whether from the point of view of health or comfort or convenience?

Baked and re-baked air, stagnant and unchanged, by the occluded heat producing it, can never be otherwise than deleterious and discomforting. What is appropriate for buildings, upholstery, carpets, and linen does not similarly serve human life and health.

The open fire, as from time immemorial, is, perhaps, the most agreeable of all forms of heating for the living room; but what of one's neighbours, who are on the far side of the chimney pot?

Only technical statisticians can tell us how many thousands of tons of filth and impurity are continuously disseminated over the costliest and the poorest dwellings alike, by the use of raw coal in household grates and ranges, or can further inform us of the wanton waste involved in such abuse of the fuel employed.

They have told us that more people are killed by soot and smoke than by accidents on the roads, and that smoke costs the average family in this country more than £3 every year.

Need for Corporate Action.

It has been suggested that local authorities, by corporate action, might do much to further the cause of smoke abatement. The Manchester City Council is already considering plans for a smokeless zone in the heart of the city. Another and very practical suggestion is that Councils should grant a reduction in the cleansing rate to householders who have been enlightened enough to make their own homes entirely smokeless. The merit of this suggestion lies in the fact that most people are naturally unwilling to adopt any new fuel simply because it is smokeless. They need some further incentive before they will abandon the traditional fuel system, based on a smoke-producing fire.

Until quite recently it was commonly assumed that smokeless homes were too costly for the ordinary household. The fallacy has been exposed by actual experience in a block of working-class flats in a poor district of London. These flats are entirely smokeless. They burn only gas and coke. Yet the tenants have found that their fuel bills are actually lower than those of the average working-class family which relies on a coal fire in the living-room as its chief source of heat.

In other words, smokeless homes are now within the means of every family. Surely that is a point of immense significance for our housing authorities, as well as for everyone who is concerned with smoke abatement.

Dirt has been described as "a good thing in the wrong place," but when it is considered that the "dirt" in case as produced, unnecessarily by coal smoke, if it were arrested and treated in the primary processes of a gas-works would provide tar for our motor roads; antiseptics and sterilizers for our hospitals; fertilizers for our fields; drugs and medicaments for a pharmacopœia; fuel for our motor cars and aeroplanes; dyes for our manufacturers; and explosives for our National Defence, isn't there something obviously wrong in defiling the buildings, upholstery, apparel, and lungs of each other, with smoke and impurity, as we *are* doing, when the alternative use of gas and coke would eliminate the evil in case?

The flueless sleeping or dwelling room, while it may consult the immediate interests of the builder and architect, is a continuous menace to health.

The provision of an open panel at the side of the chamber is mere eyewash, and is inoperative *ab initio*, or in humbler premises rendered doubly so by the simple device of putting paper over it.

Reluctance to Replace Coal Fire.

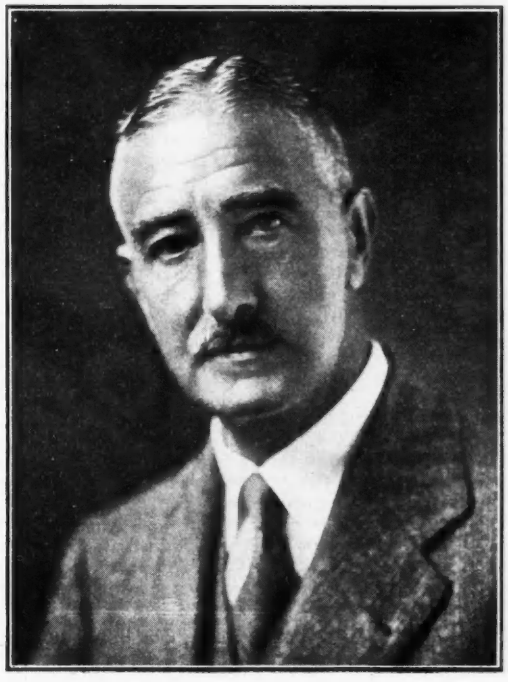
In conclusion, I would remark that the main objection or reluctance on the part of the pubic in replacing the ordinary coal fire or range lies in a previous and alternative experience of flueless heat, with which they associate the use of gas or coke as fuels.

One so often hears it said "Oh, the fumes from coke affect my throat," which is, of course, a physical impossibility with a flue in actual and effective use. Again, the somewhat discreditable argument is encountered in competitive circumstance that food is injuriously affected by the contact with the flame of gas, as if the high comparative purity of a gas flame could be more harmful than the ordinary emanations from burning coal in its crude state and manifold impurities.

In this, as in all competitive problems, however, the ultimate issue will be determined by the actual experience of the public, as in the case of all permanently established industries as contrasted with the vendors of nostrums and empiricisms, at which only a temporary success is the objective.

It would appear that the leading policy and purpose of the Gas Industry should be first to furnish data and figures of unimpugnable accuracy and dependability; secondly to supply, at whatever financial disability, only apparatus which will evidence the maximum efficiency and convenience in the use of gas; and, thirdly, not counting cost, to control and maintain in efficiency all such implements after they have passed into the care, or want of care, of the consumers.

Associated with the highest practicable measure of commercial integrity, more particularly in the matter of publicity and advertisement, these qualifications will secure to the Industry the success it merits and demands as an indispensable and paramount element in public utility service.



The EXECUTIVE CHAIRMAN OF THE B.C.G.A.,

Mr. H. D. MADDEN

(Engineer and Manager of the Cardiff Gas Light and Coke Company).

THE B.C.G.A. CONFERENCE PAPERS

Conservation of the Nation's Resources

by
Sir HAROLD HARTLEY,
C.B.E., M.C., F.R.S.

I have been asked to speak to you this morning about the contribution which the Gas Industry is making to the problem of the conservation of the nation's resources. But may I first deal with the problem in its widest sense, before turning to the particular issue which we are discussing here to-day? Our concern with this problem of conservation is of quite recent growth, as it is only with the rapid increase of our industrial civilization that we have been brought face to face with the dwindling resources of those raw materials which we owe to the geological accumulations of the past—coal, oil, and minerals.

During the XIX. century the rapid development of transport by land and sea was continually making available fresh sources of raw materials, so that with the prevailing policy of free trade their depletion did not present a serious problem. But to-day the doctrine of economic nationalism has thrown a new emphasis on the availability of raw materials, and the practical exhaustion of some of the older sources of supply is making nations conservation-minded. While it is true that on a basis of value, fuel and minerals represent only 20% of the annual world's consumption of primary commodities, the other 80% being supplied by agriculture and forestry, the significance for industrial production of supplies of energy and minerals is so great that the maintenance of these supplies in the future must present one of the most serious national problems.

The most complete survey of the resources of any country has been made recently by the National Resources Board of the United States of America, which was appointed for that purpose in 1933. The report deals with population, soil, climate, water, and minerals, and it gives a remarkably comprehensive picture of the human and physical bases of productivity of the nation. Its great value is in throwing up the large scale problems that have to be faced and their relation to one another—the changing age groups in the population, the shift of population with changing occupations, the problem of soil fertility and its relation to climate and water, the problems of soil erosion and the need for the control of water flow, the resources of water power and the reserves of coal, oil, and minerals.

High-Grade Ore.

The survey of mineral resources shows very clearly how rapidly the reserves of high grade ore are being drawn upon. For example, the known deposits of copper, zinc, and lead of economic value are estimated to last only fifteen years longer at 1929 rates of production. The finding of fresh deposits, improved methods of extraction enabling lower grade ores to be treated economically, and the increased recovery of scrap metals will all tend to lengthen the estimated lives of the home resources, but within a generation the United States will in these cases in all probability be dependent on foreign sources of supply.

This is a situation to which we are fully accustomed as our native supplies of tin, zinc, and lead have been largely used up and our best ironstone is exhausted in many districts; however, the paucity of our reserve of metallic minerals, and our meagre potential supplies of water power only serve to emphasize the national importance of our coal fields which have played such a vital part in British industrial development. We are fortunate in possessing very large reserves of coal of high quality at readily accessible depths which will supply our needs for centuries, long after the oil supplies of the world are likely to be seriously depleted, if not exhausted, and our coal reserves cover the whole range of anthracites, semi-bituminous and bituminous coals, lacking only the lignites and brown coals. Until the recent trend of industry towards the south our main industrial development had taken place near the coal fields, and a graphical comparison of the growth of population during the great period of industrial expansion in the XIX. century with the output of coal over the same period shows how closely the two were related. In 1800 the production was roughly one ton per head of population, while in 1900 it was six tons, corresponding to the higher standard of living and to the growth and mechanization of industry.

Seven Centuries for Coal.

A number of investigations have been made of the probable extent of our coal reserves, and the most recent estimate is nearly 200,000 million tons gross within a depth of 4,000 ft. The Samuel Commission when they reviewed the position in 1925 concluded that if the rate of output remained constant, the known reserves would last from four to five centuries, while the addition of probable and possible reserves would raise the period to seven centuries. The development of mining technique to extend the depth of workings below 4,000 ft. would add still further to the life of our resources.

With such adequate reserves it might seem at first sight that conservation is a matter of relatively little importance, but apart from our responsibility towards future generations, conservation implies increased efficiency which brings its own reward, and year by year the coal seams will become less and less accessible, thus involving higher mining costs. But although our total reserves are so large, are we sure that their distribution in relation to our needs of particular classes of coal is so favourable? May we not be exhausting prematurely certain classes of coal of special character?

During the last war it was realized that a more detailed survey was necessary, which would not only complete the picture by assessing the reserves of different types, but would promote their proper utilization by providing exact information as to their quality. The tendency of modern industry with coal, as with other raw materials, is to demand supplies to a definite specification suited to the particular purpose for which they are intended. This tendency, dictated by economy, is the most rational form of conservation.

The Fuel Research Board was established in 1917 to make such a survey and to investigate certain fuel problems. By 1921 the general planning of the survey had been completed and the coal fields were divided into nine districts in each of which a Survey Committee was formed with a Survey laboratory to map each seam in terms of its chemical and physical characteristics and its possible uses. Full and reliable data have now been collected for approximately 30,000 million tons of coal, representing nearly a quarter of the proved reserves of Great Britain and a much larger proportion of those likely to be actively developed in the near future.

Value of Survey.

As the work of the Survey progresses its value is becoming more and more obvious. It provides, for the first time, an accurate chart of the coal resources of the country. It tells the colleries the exact nature of their products and the variations in quality from point to point, thus helping their rational development. It tells the consumer where he can obtain the particular types of coal he requires. It gives information as to the best sources of coal for special purposes, such as hydrogenation and low temperature carbonization. It facilitates the choice of coals for blending. It indicates the best method of cleaning coals from particular seams. In fact, it is fulfilling the purpose for which it was

founded, "to promote the better utilization of the national coal resources."

In one respect the plan of the Survey is incomplete, as no attempt has been made to estimate the extent of our reserves of coals of different types, and this is obviously a matter of prime importance to the gas and coke-oven industries which are dependent on supplies of coal with definite characteristics. Even if the total reserves are adequate they may not be distributed proportionately among the different coal fields. In the absence of definite information it is impossible to say more than that the trend of supply and demand has indicated clearly the importance to both sections of the carbonizing industry of adapting their technique to enable them to utilize an ever widening range of coals for their specific purposes. This is a direct step towards conservation.

Turning now to the utilization of coal, a comparison of the tonnage used by the various home consumers in 1920 and 1937 shows some interesting features.

Consumption of Coal in Great Britain.

Consumers.	Million Tons.	
	1920.	1937.
1. Gas-works (excluding the coal equivalent of gas coke exported)	16·88	18·17
2. Electricity generating stations belonging to authorized undertakings and to railway and tramway authorities	7·36	14·75
3. Railway companies (for locomotive use) ..	13·42	13·05
4. Vessels engaged in the coastwise trade (bunkers)	1·28	1·23
5. Iron works (including coke used in blast furnaces)	17·83	14·39
6. Other iron works and steel works	12·79	8·91
7. Collieries (engine fuel)	17·20	12·15
8. General manufactures and all other purposes (including domestic use)	93·96	99·13
Total	180·72	181·78

The fact that the total consumption has remained about stationary is due largely to the increased efficiency of utilization. I have made a rough calculation of the savings effected by the technical improvements in the case of gas, electricity, railways, iron and steel, and collieries. If the efficiences of these industries had remained at the 1920 levels, in 1937 they would have required 47 million tons more coal, or 58% of their 1937 consumption.

If we go back to 1913, when the home consumption was 184 million tons, and we add to this the consumption of fuel oil converted to an equivalent thermal basis, we find that the total fuel consumption was almost unchanged over a quarter of a century. During that time the population has increased by 10%. The use of power and heat in manufacturing furnaces has been widely extended to secure increased production from human effort. Important new industries have come into being and domestic requirements for light, heat, and power have increased to higher standards. The striking fact therefore emerges that in Great Britain the additional energy required as a result of these years of progress has been obtained from the same amount of fuel by means of the great advance in fuel economy made in this period.

Efficiency of Utilization.

In this survey of the efficiency of utilization coal has been considered merely as a source of heat units, but it is much more than that. Coal is a complex chemical substance, which by suitable treatment will yield gas, a smokeless fuel of great flexibility and almost universal applicability to heating problems; coke, a smokeless solid fuel with many diverse uses from the blast furnace to the open domestic fire, and in addition a variety of chemicals with a wide range of uses, such as motor spirit, wood preservatives, and as raw materials for the manufacture of tar macadam, dyestuffs, plastics, and high explosives. This is the contribution which the Gas Industry and its close associate, the coke-oven industry, are making to the problem of conservation, and at the same time to satisfying many of the demands of modern life for heat, energy, and raw materials.

The Gas Industry has a good record of public service for over a century and a quarter, but it was not until 1920 that its essential modern function as the producer and supplier of smokeless gaseous and solid fuels was recognized by the introduction of the therm as the logical basis for the sale of gas. Freedom from the older illuminating standards gave a great impetus to technical development, and the partnership of the gas engineer with the chemist has been most fruitful in results during the last twenty years on the manufacturing side. The development of improved types of retorts and ovens, the gain in heat economy by better heat utilization and transmission, by recuperation, by waste heat boilers, and the improvement of producers have together increased the thermal efficiency of carbonization from 70 to 86%, representing a saving of over four million tons of coal a year. In this result the recognition of the need for constant scientific control of the carbonizing process has certainly played a part. But in addition to this saving in raw material other technical advances have reduced the costs of manufacture. Improved refractories and methods of construction have greatly increased the lives of retorts and reduced leakage. Mechanical handling has reduced the labour employed in carbonizing by 75%, and this saving has facilitated the growth of the distribution and sales section where a higher standard of service has necessitated the employment of a much greater number of skilled workmen.

Similar progress has been made with water-gas plant, which is so valuable for stand-by purposes and as a means of adjusting the proportion of solid and gaseous fuels to the demand, thus increasing the flexibility of production. Automatic plant, self-cleaning grates, the utilization of waste heat, and improved methods of oil cracking have all contributed to the efficiency of manufacture of carburetted water gas.

Importance of Purification.

Purification has become a matter of outstanding importance in relation both to cost, amenities, and its effect on the efficiency and life of gas burning appliances. Here again the engineer and the chemist have co-operated most successfully. Research into the principles underlying condensation and gas washing for the removal of ammonia, naphthalene, and benzole is showing its result in economics both of cost and space. Active charcoal is being used to remove benzole and sulphur compounds from the gas stream. The drying of gas is eliminating difficulties due to water and rust in service pipes, while the problems connected with the removal of sulphur, nitric oxide, and gum are being steadily solved. Thus on the manufacturing side the steady application of scientific research and control over the wide range of problems involved has led to great technical progress, both as regards thermal efficiency, cost of operation, purity of the gas, and yields of by-products. There has been a general co-ordinated advance all along the line in which the co-operation of the engineering and scientific staffs has been an outstanding factor.

The next step is to distribute gas from the works to the consumer, and here the area of distribution has been increased both by the modern tendency of population to move from cities to the outer suburban areas, and by the policy of amalgamation which has led to the closing of many small and inefficient works and the supply of gas from a central point. The problem of commercial distribution over larger distances has been solved by the use of high-pressure feeder mains with automatically controlled governor or storage stations in the outlying districts. The main technical advance has been the use of steel mains and welded joints for the high-pressure system. As a result of these extensions of the areas of supply it is estimated that 95% of the houses of the country are now using gas for one purpose or another.

Advances in Domestic Appliances.

This recognition of the merits of gas for domestic purposes is not surprising if one considers the enormous advances that have been made in the domestic appliances in which gas is used. The old black cooker and the Victorian gas stove have been replaced by modern designs with simple lines and surfaces, the effect of which is enhanced by the colour and texture of the new surface finishes, such as vitreous and stove enamels. Manufactured by mass production methods, they combine the merits of cheapness, efficiency, and attractive appearance. The public demands for the new appliances have necessitated doubling production during the past ten years, and the annual output at present is about two million appliances, more than half of which are cookers. Their in-

stallation and effective maintenance have meant a new standard of outdoor service, and in one undertaking the outdoor staff is 50% greater than in 1922 in proportion to the amount of gas sold.

Not only have the older appliances undergone revolutionary changes in design, both as regards convenience, efficiency, and appearance, but a new range of uses has been found for gas in refrigerators, water-heaters, wash-boilers, washing-machines, gas-irons, and drying-cabinets. Automatic ignition, time controls, remote controls, thermostats, and thermo cut-offs all contribute to the effectiveness of the apparatus. With its modern equipment gas has contributed to a new standard of warmth, comfort, and labour-saving in the modern house, and the speed of service it can give makes it invaluable. Mr. Masterman in his Paper to The Institution of Gas Engineers on The Future of Gas Appliance Design has given a very comprehensive picture of the advances in this field and the lines of future development, and he has shown clearly how scientific research had been applied to the fundamental principles of design, while at the same time convenience and efficiency had been studied down to the smallest details. The efficiency of cookers has been increased by 15%, of water heaters by 40%, and of gas fires by 30%, which together, he says, "for the average household represent at least 20% extra service, or, alternatively, 20% decreased gas consumption for the same service."

I think that this statement summarizes the two-fold advantages that scientific development of the Gas Industry has provided for the consumer. The economies, at every stage from carbonization to combustion, not only present the same service at reduced cost, but the developments in utilization of gas and coke have made new forms of service available. Thus the carbonizing industries have not only promoted the conservation of coal by a more efficient treatment than burning it in the raw state, but they have added to its uses by developing novel as well as substitute services. Looking to the future it is along these lines that still higher standards of comfort will be reached.

Home of the Industrial Revolution.

Speaking last year for the British Delegation at the World Power Conference at Vienna, I said that we came from the home of the Industrial Revolution which by the application of power to the processes of production made possible the great industriai developments of the XIX. century that have affected the human race so profoundly. But I maintained that the XX. century had had its own revolution no less far-reaching, the domestic revolution in the scientific application of fuel and power to the home. Indeed the Papers written for that Conference bore eloquent testimony to what had been accomplished in the fields of heating, lighting, cooking, refrigeration, air-conditioning, and in a thousand other ways to save labour, to give greater comfort, and above all to raise the standard of the health of many millions. This domestic revolution may be regarded as the paying by the technician of a deferred debt long overdue for some of the social consequence of the mechanization of industry in the last century. And to this revolution the Gas Industry has made a notable and essential contribution.

But there is another field in which gas has made remarkable progress in recent years, namely, in industrial heating. There again progress has been due largely to the application of scientific principles to the design of apparatus and to the resulting economies. Gas has the unique advantage of being able to produce controlled temperatures up to 1,500° or even 2,000° C. with an atmosphere of controlled composition, and the heating problems of many industries are finding an economical solution by its use. Modern designs based on studies of heat transfer, insulation, and heat recovery give higher efficiencies than the older solid fuel appliances, and they have the advantage of automatic control, convenience, cleanliness, and reduced labour and wastage costs. A steadily increasing amount of gas is being used for these purposes, and the establishment of Industrial Centres to deal with industrial heating problems has done much to stimulate development in this field.

The second product of the Gas Industry is coke, a smokeless solid fuel, and this is perhaps the most convenient point at which to consider the relationship of the two sections of the carbonizing industry, gas and coke ovens, which is of considerable importance from the point of view of conservation. The primary object of the coke oven industry is the production of metallurgical coke, and until recently coking plants were mainly situated at collieries, where they formed a useful outlet for the slacks of coking coals. The gas produced was used to heat the ovens, and the surplus was largely wasted. The modern practice is to build the coking plants in larger units at steel works for the sake of heat economy, as the blast furnace gas can be used to heat the ovens, and the richer and more valuable coke oven gas can be used in the steelworks or sold to neighbouring gas undertakings.

Utilizing Coke Oven Gas.

There has been a steady increase in the amount of surplus coke oven gas used in this way during recent years representing a considerable economy in the consumption of gas coal:

Year.	Coke-Oven Gas Bought by Gas Undertakings.
1926	2,322 million cu.ft.
1931	10,948 " "
1934	18,194 " "
1935	20,474 " "
1936	24,531 " "
1937	27,486 " "

One result of the purchase of coke oven gas is the virtual closing of certain gas works except for their use as a standby, and this affords a new outlet for surplus oven coke in the domestic market which may help to solve the problem of arriving at an accommodation between the two industries as regards the home and export coke markets. This is obviously difficult, since the Gas Industry is working on a fairly steady load with statutory obligations with regard to supply and quality, while the coke oven industry is subject to the fluctuation of demand for iron and steel. From the point of view of conservation the closer the understanding is between them, the better.

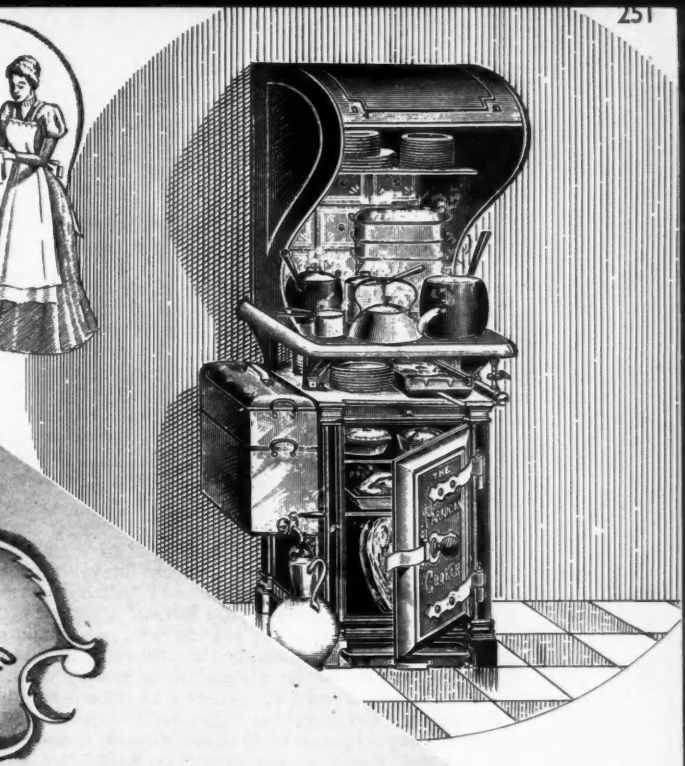
Returning to the production and utilization of coke in the Gas Industry, this is a field where considerable advances have been made recently, both in improving the quality of the coke and in designing appliances for its combustion. A close study has been made of the effect of carbonizing conditions in different types of retorts and ovens on the characteristics of the coke, in order to be able to supply material with the properties required for particular purposes. A study of blending has not only yielded improved cokes but has enlarged the range of coals from which they can be produced. Improvements in coke quenching, sizing, and grading have had an increasing influence on the popularity of coke as a clean and smokeless fuel. The domestic market is increasing rapidly with the improved quality and with the introduction of specially designed coke grates with gas ignition and of other domestic appliances. Similarly the redesign of furnaces with automatic gravity feed stokers, thermostatic control and increased efficiencies has helped to establish coke as a fuel for large central heating plants and for a variety of industrial heating purposes.

A Cheaper Source of Thermal Units.

As compared with gas, coke is a cheaper source of thermal units, but it lacks its flexibility and quickness of service, and involves storage and labour. Like gas it has the advantage of absence of smoke, and, as Mr. Masterman has shown so clearly in his Paper, gas and coke between them can supply the fuel needs of almost every type of establishment, while at the same time rendering a great service to the community by helping to produce a smokeless atmosphere. Looked at from the angle of conservation the use of coke is in fact the utilization of the residual energy of coal after the more valuable gas and chemical by-products have been removed from it.

Finally, I come to the chemical by-products of the carbonization of coal. Improvement in the efficiency of their recovery has contributed to the increase in the overall thermal efficiency of carbonization, of which I have spoken, but we seriously underrate these by-products if we think of them purely on a thermal basis. This would do justice neither to their actual value, nor to their importance as the starting materials of other large industries. Carbonization at temperatures above 1,000° C. yields 2-3 gallons of benzole and about 12 gallons of tar per ton of coal, and as these repre-

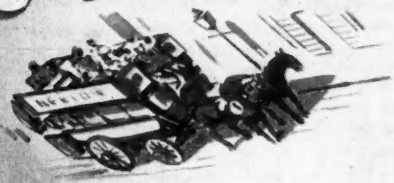
The GAS INDUSTRY may well be justified in reviewing with pride its amazing progress in the competitive field of public utility.



The EVOLUTION of PARKINSON GAS APPLIANCES

PARKINSON

ies of this
chure will be
ly forwarded
request.



The name PARKINSON has been closely associated therewith, playing a noteworthy part in the forefront of progress and development.

PARKINSON STOVE CO., LTD. BIRMINGHAM 9

London Showrooms:-
Terminal House, Grosvenor Gardens, S.W.1.

sent the only indigenous source of benzene hydrocarbons and their derivatives, they are of great national significance both in peace and in war.

Phenol is not only the basis of picric acid, but one of the most important raw materials in the plastics industry. Similarly toluene is the parent of T.N.T., but also, with other coal-tar derivatives, the raw material for the preparation of dye-stuffs. In addition, naphthalene is used as an insecticide, creosote provides the best wood-preservative and is converted into motor spirit by hydrogenation, while innumerable drugs and fine chemicals are derived from coal-tar products. Besides the benzole, which owing to its anti-knock qualities is so valuable as motor spirit, carbonization provides a whole range of solvents.

Tar and Benzole.

The importance of tar and benzole for two such industries as plastics and dyes alone makes one realize that by-products is scarcely an adequate term. In fact, it is true to say that, even if we did not require gas and coke, we should still have to carbonize coal to supply the industries that require tar. If that appears to be a fanciful statement, we need only recall the importance of toluene and phenol for the manufacture of explosives, and remember that in the last war all undertakings were asked to strip their gas.

Normally, only a part of the tar is distilled to give the maximum range of products. A large proportion is converted, by removing the lighter fractions, to road tar, for dressing road surfaces and for use as a binding material with a mineral aggregate forming tarmacadam. Here again great progress has been made, both in methods of manufacture and in the technique of application to the roads, to give a much improved surface for motor traffic that is cheaper to maintain than the older types of road under the same traffic conditions. This successful result has been the outcome of close co-operation between chemists and engineers, using scientific methods of investigation and control.

In addition to tar and tar products, there is the ammonia from the washers, which yields some 350,000 tons of ammonium sulphate for use as a fertilizer. The sulphur that accumulates in the oxide purifiers is finally converted into sulphuric acid, of which 220,000 tons are produced from this source each year. If raw coal had been burnt instead of carbonized, a corresponding amount of sulphur would have contaminated the air and added to the problem of atmospheric corrosion. Still more sulphur is being removed by improved methods of purification, which aim at eliminating it completely from gas.

The annual production by the carbonization of coal of some of the most important of these chemicals emphasizes its significance for our chemical industry, and as there is no alternative source in this country in a national emergency it would indeed be a key industry.

Approximate Annual Production of By-Products in the Gas and Coke-Oven Industries

Benzole	50 million gallons
Sulphate of ammonia	350,000 tons
Sulphuric acid (from spent oxide)	220,000 tons
Tar, over 2,000,000 tons, which yields—	
Road tar	700,000 tons
Pitch	600,000 tons
Creosote	90 million gallons
Naphthalene	30,000 tons
Cresylic acid	20,000 tons
Phenol	5,000 tons
Toluene	5 million gallons
Xylenes and solvent naphthas	5 million gallons
Pyridine bases	4,000 tons

In this Paper I have tried to sketch for you the contribution which the Gas Industry is making to the conservation of the nation's resources in each of the three main fields of its activities, gas, coke, and by-products. That contribution depends largely on the rapid technical progress that has been made over the last twenty years, during which the Industry has brought scientific research to bear on all its major problems. As a result we have seen the greatly increased efficiencies in every section of the Industry which all mean savings of raw material, savings of cost, and savings of labour. The basis of the Industry is the scientific use of a single raw material—coal—in order to derive the maximum advantages from it. A comparison with the burning of raw coal shows not only a saving of material, but a service which has added enormously to the standard of comfort, cleanliness, and hygiene in the home, a reduction of the smoke problem in great cities, and a recovery of large quantities of chemicals essential to the industries of this country. For all these reasons the carbonizing industry must form a permanent part of our industrial fabric.

Problems Still to be Solved.

There are still plenty of problems to be solved. Among the most outstanding are—widening the range of coals for carbonization, complete gasification, and improved methods of purification and of by-product recovery. All of these have a special significance as regards conservation. More than 50% of the domestic fuel requirements of this country are still met by the burning of raw coal, and in this direction alone there lies an ample field of opportunity for expansion in the future.

APPENDIX A.

CONSUMPTION OF COAL IN GREAT BRITAIN.

Consumer.	Quantity (Million Tons). 1920.	1937.
1. Gas-works (excluding the coal equivalent of gas coke exported)	16·88	18·17
2. Electricity generating stations belonging to authorized undertakings and to railway and tramway authorities	7·36	14·75
3. Railway companies (for locomotive use)	13·42	13·05
4. Vessels engaged in the coastwise trade (bunkers)	1·28	1·23
5. Iron works (equivalent of coke used in blast furnaces)	17·83	14·39
6. Other iron works and steel works	12·79	8·91
7. Collieries (engine fuel)	17·20	12·15
8. General manufactures and all other purposes (including domestic use)	93·96	99·13
Total	180·72	181·78

APPENDIX B.

RISE OF POPULATION AND COAL CONSUMPTION IN GREAT BRITAIN.

[Indices calculated on basis of 1911 figures = 100.]

Year.	Coal.	Population.
1700	0·8	16·0
1750	1·8	
1760		19·0
1770	2·2	
1780		22·0
1790	2·8	
1795	3·7	
1801		25·9
1811		29·3
1816	5·5	
1821		34·5
1829	11·0	
1831		39·8
1841		45·4
1851		51·0
1854	23·8	
1861	30·7	56·6
1871	43·2	63·9
1881	56·7	72·8
1891	68·2	80·9
1901	80·5	90·6
1911	100	100

Estimates

APPENDIX C.

COKE-OVEN GAS SOLD TO GAS UNDERTAKINGS.

Year.	Million Cu.Ft.
1921	1,325
1922	3,636
1923	4,268
1924	4,471
1925	4,798
1926	2,322
1927	5,340
1928	6,560
1929	10,948
1930	13,201
1931	13,923
1932	15,441
1933	16,327
1934	18,194
1935	20,455
1936	24,329
1937	27,486

THE B.C.G.A. CONFERENCE PAPERS

FURTHER ASPECTS OF

The Retention and Development of the Domestic Load

by
R. J. ROGERS

It will be remembered that the Programme Committee of the Joint Gas Conference, at the recent British Industries Fair in Birmingham, selected this subject for Papers and discussion, as being the most important problem before the Gas Industry to-day. Short Papers were read by Mr. G. E. Currier on "Space Heating," Mr. Geo. Dixon on "Cooking," Mr. W. W. Townsend on "Water Heating" and Mr. W. Clark Jackson on "Lighting and General Appliances."

Contributions to the discussion were made by members of the Society of British Gas Industries and others.

Pressure of time prevented a long discussion on the Papers submitted and on the motion of Major F. J. Bywater, it was decided that, in view of the urgent importance of the subject, the Papers and discussion at the meeting should be referred to the constituent bodies of the British Gas Federation for further consideration in the Districts and at other suitable meetings.

I understand it is the intention of the Executive Committee of this Association that the subject will be brought up for discussion at District Meetings in the near future. The fact that, while most of the problems involved are common to all Districts, some Districts have their own peculiar problems, justifies this procedure, and we can be assured that as a result, they will be thoroughly dealt with, and include many more contributions to the discussion than would be possible at a single meeting of the national body.

I can only hope, therefore, in this Address to focus attention on some of the basic factors involved in the consideration of the domestic load and on the salient points brought out at the Joint Gas Conference.

Gas Is a Service.

In dealing with the subject of the domestic load, we must always bear in mind the vital fact that gas is a service, not a commodity. Unless this is fully appreciated a complete measure of success cannot attend our efforts. It is the basic principle upon which we can build our policy, and one upon which both supply undertakings and appliance manufacturers can agree and model their programmes.

When a consumer purchases a gas cooker, fire, or water heater, it is not the appliance and the amount of gas consumed that he is prepared to pay for, but the actual service it will render—the means of obtaining perfect cooking—the comfortable warmth in the home and freedom from dirt and smoke—the pleasure of warm baths at will—ever ready hot water for household purposes—and the many advantages to be derived from refrigeration.

He is as little interested in the actual appliance as the average listener is interested in his wireless set. Appliances and fuel are a means to an end—and that end is satisfaction through service.

It is in the promotion of this service that the gas supply undertakings and the appliance manufacturers should, and in fact do, co-operate. Each must make its own individual contribution, but there are certain aspects of Service which require a joint effort.

It has been estimated that the domestic load in this country represents 60 to 70% of total gas sales, and of this cooking is responsible for 75%, or between 45 and 55% of the total gas load.

It is interesting to record that a summary of reports to the American Gas Association from Gas Companies representing 9,817,521 meters regarding new homes constructed during 1938 in connexion with gas for the four big jobs, shows that 88·1% of these new homes cook with gas; 74·1% heat water with gas; 12·1% use gas for refrigeration and 56·6% use gas for house heating.

It would appear from this that gas for domestic purposes in the United States is certainly being developed to a great extent in new homes, and it would be interesting if we could obtain similar statistics regarding the development of the use of domestic gas in all new houses built in the United Kingdom during the past year.

In my opinion it is desirable that national statistics regarding the retention and development of the domestic load should be available in our Industry, and I suggest that a co-ordinated survey should be made. Such a survey would require the wholehearted co-operation of all Gas Undertakings in this country, who would be required to supply annually certain statistics relating to the sales of gas and appliances in their respective areas, in order that comparisons might be made year by year of the growth or otherwise of the domestic and other loads.

At the present time it is estimated that nine million gas cookers are in use in Great Britain. A shock to our equanimity is provided, however, by electrical statistics, which show that one million electric cookers are also in use. For every nine gas cookers, one electric cooker. When we realize the portent of these statistics, we must appreciate that the domestic load and its retention demands our most serious thought.

Our service must be universal in its appeal. We cannot say that the problem of the domestic load has been satisfactorily solved in any district until we are satisfied that terms are available which can meet the pocket of every potential user of gas in that district allowing them the fullest service which gas can give.

Is every administrator satisfied that the returns from the domestic load to-day are the maximum possible for his district? I suggest that there are very few who, on close examination, could answer in the affirmative.

An Adequate Supply of Gas of Constant Quality.

The supply Undertakings must first and foremost provide an adequate supply of gas of constant quality. Mr. Townsend in his Paper on Water Heating stated, "it cannot be too often stressed that the ideal gas should be unvarying in quality as to calorific value, specific gravity, and air required for combustion, within narrow limits, and that its sulphur content should be low and its inert constituents reasonably low.

"As to pressure, unless the pressure at the service is reasonably constant at all times a governor should be fitted to every appliance."

Mr. Townsend was referring to water heaters, but his remarks are equally applicable to all forms of domestic gas appliances. The modern appliance is, or should be, a scientific instrument, capable of giving the best service under certain optimum conditions. While a reasonable tolerance is, and must be allowed, it should be appreciated that, the more one can standardize the quality of the fuel, the more precise can the construction of the appliance become, making for increased efficiency and effectiveness.

A very pleasing feature of gas appliance development is the gradual adoption of constant pressure governors as an integral part of the appliance, and the use of fixed, calibrated nipples to give an unvarying and uniform rate of gas consumption.

The question of combustion characteristics and the con-

sequent A.T.B. number is of importance. Provided that the gas is of reasonably constant composition, burners may be designed to give satisfactory performance with that gas, but the alteration of composition, resulting in alteration of the A.T.B. number may cause a good burner to give unsatisfactory performance.

Specific Gravity is another factor which should be kept within narrow limits. Again, the limits set to the gas rate for a flueless gas heater could be raised considerably if the organic sulphur content of gas could be reduced.

It is not within the province of this Paper to outline all the advantages which would accrue to the Industry by the reduction of the sulphur content of gas, but I would like to refer to Mr. T. F. C. Potterton's remarks on Mr. Townsend's Paper directing attention to the deleterious effect of sulphur upon water heaters, particularly the finned type of apparatus which become choked very rapidly when the sulphur content is high. The elimination of sulphur would prove an inestimable boon to the manufacturer of gas appliances and would also result in economy to Gas Undertakings in the maintenance of appliances.

The Question of Appliances.

Given an adequate supply of gas of constant quality and pressure it is necessary to consider the appliances through which gas can accomplish its service.

There are available to-day, as everyone knows, a large number of modern domestic gas appliances from which a choice may be made. On the other hand, there are still in use many appliances which may be termed out-of-date and obsolete and which do not reflect credit to gas usage. In the choice of appliances it should be remembered that the retention of the domestic load depends upon these being of such a character as to ensure their giving complete satisfaction to the user throughout their life. Every form of publicity available, such as Showroom Window Displays, Advertisements, Exhibitions, &c., should be utilized to bring modern gas apparatus to the notice of consumers, and such apparatus should be offered at rates which will commend themselves to the respective classes of gas users.

With the new type of streamline cookers which are now available it should be possible to offer these on long term hire purchase in the knowledge that they will not be considered out-of-date at the time when the consumer is paying the last instalment.

A measure of primary importance in developing the domestic load is the provision of gas supply pipes of adequate size in all new houses.

Much valuable gas consumption has been, and is being, lost due to the fact that houses have not been carcassed with gas supply pipes. Every Undertaking should fully realize the importance of appointing representatives whose special duty should be to contact with architects and builders, in order that due provision should be made for the use of gas appliances.

It is regrettable that ventilation flues are now being omitted in a large number of modern domestic dwellings. Quite apart from the fact that gas-fired ventilated appliances are unable to be used in such premises, it is, from the hygienic standpoint, a retrograde step.

Where a properly constructed flue exists, continuous ventilation at no cost is ensured. Notwithstanding the efforts which have been made by the Gas Industry in the past to direct the attention of the Ministry of Health to the need for flues, no opportunity should be lost to demonstrate to official departments in both National and Local services the hygienic value of effective ventilation of all habitable rooms.

The absence of flues has necessitated the introduction of flueless gas appliances, and unless these are used, the Gas Industry will suffer a loss of gas sales. The value of collaboration between the manufacturers and laboratories of the supply undertakings has been demonstrated by the production of efficient and safe types of flueless appliances.

For their satisfactory performance gas appliances require careful installation by properly trained fitters. We have all, from time to time, come across examples where, notwithstanding the fact that a high grade and well-designed appliance, representing a combination of skill and ingenuity on the part of the manufacturer, has been purchased by a consumer, poor fixing has resulted in an unsightly installation, and in many cases in unsatisfactory working.

All gas appliances should receive periodic maintenance and attention by properly trained maintenance men to ensure the continuance of their satisfactory working. In the design of modern gas appliances manufacturers endeavour to reduce the need for maintenance to the minimum, but with certain types of appliances some special attention is essential from time to time if they are to be maintained in their initial efficiency and effectiveness.

Installation and maintenance should, wherever possible, be undertaken by the personnel in the direct employ of gas undertakings. Where circumstances compel the work to be carried out by local plumbers or contractors close supervision by the Undertaking's representatives should be exercised.

The training of fitters in installation and maintenance work will become more important as appliances become more scientifically constructed. The ideal service to the gas consuming public will not be attainable unless fully trained fitters and maintenance attendants are available.

It is desirable that sales staffs should have training not only in salesmanship, but to some extent in the technical features of the appliances which they are called upon to sell, so that they may be able to speak with authority to the consumers, and be able to differentiate between, and compare different types of appliances. The fully trained salesman will thus be in a position to push those appliances which will result in the highest degree of consumer satisfaction.

In recent years there has been a considerable improvement in the standard of gas salesmanship by reason of the introduction of educational courses in the subject, and the excellent work which is being conducted by the various Gas Salesmen's Circles throughout the country.

A study of the programmes of these Salesmen's Circles indicates that many of the problems associated with the retention and development of the domestic load are fully appreciated and are being discussed with enthusiasm by men and women who are brought into daily contact with the gas consumers' requirements. I feel, however, that greater success would attend the efforts of many Gas Sales Circles if some directive line of policy embodying regional agreements as to types, terms, and conditions of supply were outlined by the administrators of Gas Undertakings.

The Price of Appliances.

I am assuming that it will be generally agreed that the primary object of the supply undertaking is to sell gas at a profit, and therefore appliances are only a means to that end.

On the question of the price at which domestic gas appliances are sold to the consumer there appears to be a wide divergence of opinion in the Industry. Numerous instances could be quoted where for the same service the charges to the consumer vary by three to one.

In some Undertakings it is the policy to charge to the consumer the purchase price of the appliance from the manufacturer, *plus* fixing and maintenance charges and interest on capital, while other Undertakings consider that in addition to these items a certain percentage should be added for profit on the sale of the apparatus, such profit percentages being of wide variation.

It is not within the province of this Address to justify or condemn either policy, but I am firmly convinced that it is in the best interests of the Industry to ensure that the terms offered to gas consumers in contiguous areas at least should be relatively the same.

I am well aware that in different parts of the country various factors have to be taken into account in arriving at the charge for appliances to be made to the public, but I maintain that it should be possible to obtain regional agreement in this matter of appliance charge to the public.

This is a matter which I suggest might be considered by the District Committees of the Association at an early date. Such regional consideration would, I think, disclose a great diversity of prices for the same appliance.

It is assumed that the charges made by manufacturers for domestic gas appliances are the minimum possible, consistent with the costs which the manufacturer has to bear, and I will refer to this in my remarks on the rôle of the appliance manufacturer.

Conditions of Supply.

Another subject on which varying views are held is the question whether appliances should be offered on hire purchase terms, and the period over which payment should be made, and to what extent simple hire or even free terms should be offered.

Mr. Geo. Dixon in his Joint Gas Conference Paper on Cooking divided his consumers into three classes, and apportioned them as follows:

	%
CLASS A.—Those who are assisted in their household by the employment of two or more servants	10
CLASS B.—Those who can afford some assistance, but who share domestic duties	40
CLASS C.—Those who, of necessity, do all their housework ..	50

He suggested that Class A can afford to consider the purchase of the best and most expensive types of cookers. Class B are dealt with by medium hire purchase at the expense, to a great extent, of established simple hire. Class C cannot afford to pay anything at all for the cooker they need just as much as the other classes.

It is, in my opinion, desirable that all Gas Undertakings should classify their consumers in order to arrive at a basis for the adoption of a policy of providing the most appropriate service of appliances to their consumers. I have in mind certain districts where, owing to the absence of attractive terms for a particular class of consumer, the domestic gas load has not in the past been promoted to its fullest extent. The recent adoption of modern appliances on suitable terms in that district has led to an immediate improvement in the load and I am confident that similar satisfactory results would follow in other towns by the inauguration of a similar policy.

Holding Companies have undoubtedly set an example in adopting standardized terms and conditions relating to appliances to be offered to consumers in their Constituent Companies.

Tariffs.

In my observations on the Papers read at the Joint Gas Conference dealing with space heating, I stated that the problem was not the cost of the appliances but the cost of the fuel, bearing in mind the competition with various types of solid fuel and with electricity.

The question of tariffs for gas is probably the most important subject which the Gas Industry has to consider today. Whilst it has a most important relationship to the retention and development of the domestic load, and is of extreme importance, it is obviously an aspect of the subject which cannot be dealt with in an Address of this character, and I think it will be generally agreed that every effort should be made by the Industry to provide platforms and meetings for the discussion of the subject.

During recent years many Gas Undertakings have adopted various tariffs, and whilst it would seem impossible to frame a tariff which would meet with universal acceptance, a great deal can be done by the further consideration of the subject at District Meetings where the local factors affecting price can be fully taken into account. Evidence will no doubt be forthcoming to show that the introduction of new forms of charging have been justified by the increased consumption of gas and the resultant increase in revenue, and it should be possible to obtain a much greater measure of agreement to the early adoption of tariff systems.

It will on reflection be agreed that the increase in the use of gas for *industrial* purposes dates from the time when a preferential tariff was introduced for such purposes. Similarly, I think a greater development of gas for domestic purposes would follow the introduction of new tariffs.

Water Heating.

Consideration of the problem of the domestic load would not be complete without some reference to the enormous potentiality for gas sales which exists for domestic hot water apparatus and central heating appliances.

I would refer you to the Papers presented by Mr. G. E. Currier and Mr. W. W. Townsend to the Joint Gas Conference, and to the observations of Mr. T. F. C. Potterton on the two Papers.

There appears to be a tendency on the part of some Undertakings to advocate the use of the instantaneous type of water heaters to the exclusion of those of a storage type. Capital cost of apparatus and installation is an important factor in considering the type of water heating appliance to install, and in this respect I consider the circulator combined with lagged storage has much to commend it for service of thousands of domestic premises.

There is undoubtedly a need for both instantaneous and storage types, and so far as the manufacturers are concerned, they have provided appliances which should meet the need

If the Industry is to derive increased gas sales for domestic of all consumers.

water heating, an increased amount of attention must be devoted to the study of this subject, with a view to the training of advisory staffs on water heating, in order that they should be in a sound position to recommend the type of water heating apparatus best suited to the particular requirements of the consumer.

The main factor in the development of the water heating load, particularly for central heating boilers, is the price at which the gas is offered to the public, and the potentialities for increased consumption of gas from water heating should be given special consideration by framers of new tariffs for gas usage.

Gas Lighting.

For almost a century in most gas undertakings, gas lighting was considered the backbone of the Industry, but in recent years the domestic lighting load has gradually been displaced by electricity.

Whilst one must appreciate the reasons for this change in many domestic premises, the loss of domestic lighting would have been far less if all Undertakings had tackled the problem in the manner outlined by Mr. W. Clark Jackson in the contribution he made to the Joint Gas Conference at Birmingham. The material advantage which the Neath Gas Department has derived from a progressive lighting policy could, I suggest, have been obtained by the majority of Gas Undertakings in this country if similar measures had been adopted as a national policy for the whole Industry.

The views expressed at the Conference by Colonel C. J. Falk on behalf of the manufacturers of lighting equipment are worthy of the serious consideration of all in the Industry.

Although gas for street lighting is not classified as part of the domestic load, its loss would, nevertheless, in most undertakings have to be replaced by further efforts to increase the domestic load. In some undertakings public lighting represents as much as 10% of the total load, and it requires little imagination to appreciate the difficult problem of replacing this consumption by gas used for domestic purposes.

I am convinced that, notwithstanding all the circumstances of competition with electricity, greater security of tenure for gas street lighting would be obtained if more vigorous attention were paid to the subject.

The efforts of the Joint Lighting Committee of The Institution of Gas Engineers should receive the wholehearted support of the Industry in retaining the public lighting load.

The following is a brief summary of the rôle of Gas Supply Undertakings as affecting the domestic load:

1. Advisory campaigns with architects and builders to ensure gas installations in all new property.
2. Realization that the primary object is to sell gas service and that appliances are only a means to that end.
3. Tariffs for gas.
4. Campaigns to oust old-fashioned appliances.
5. Marketing of appliances at reasonable prices to various classes of consumers.
6. Standardization of appliances to reduce costs.
7. Periodical maintenance of all appliances.

The latest New World No. 345 in a modern kitchen setting.

NEW WORLD

Regulo-Controlled

GAS COOKERS

Radiation, Ltd.

The Role of the Appliance Manufacturer.

Many millions of capital are invested in the organizations of the manufacturers and contractors in our Industry. It will be realized, therefore, that the subject of the retention and expansion of gas sales is of vital interest to all of them, and the manufacturers of gas appliances are especially concerned with the development of the domestic load.

The main function of the appliance manufacturers is to invent, design, and produce suitable appliances in order that, in conjunction with the gas supplied by the undertakings, effective gas service may be rendered to the public. This demands that the closest possible co-operation should exist between the manufacturers and the gas undertakings.

Mr. Geo. Dixon, in his Birmingham Paper, emphasized what he stated to be an important irrefutable fact, that is, that the domestic load is the backbone of the Gas Industry, and that cooking is the backbone of the domestic load. It will, therefore, be acknowledged that the appliance manufacturers have a great responsibility to the Industry in taking their share in maintaining the domestic load.

I think it will be generally agreed that appliance manufacturers who have been associated with the Gas Industry for a large number of years have, through their laboratories, development departments, and works, produced efficient appliances which have enabled Gas Undertakings to maintain their sales.

Large sums of money are spent annually by manufacturers on research in their quest for improvement in the efficiency and design of domestic appliances.

Mr. Dixon, in speaking of the relationship between the manufacturers and the supply undertakings, stated that new productions should be the result of joint consideration and co-operation between the two parties concerned. In point of fact this is what actually happens. Every appliance manufacturer has his staff of representatives who contact with the whole of the Gas Supply Undertakings in the country, and each manufacturer is therefore kept informed of the general requirements of Gas Undertakings.

The suggestions and views expressed by representatives of Gas Supply Undertakings, based on their actual knowledge of consumers' requirements and maintenance features, are always welcome, and I am sure are given full consideration by the different gas appliance manufacturers.

The Manufacturers' Problem.

Six main factors must be considered by the manufacturer in the development and construction of appliances for domestic use. These are as follows:

Appearance or eye-appeal is of great importance since appearance sells appliances.

The behaviour and efficiency must be studied, where efficiency is understood to mean the ratio of thermal output to thermal input, while effectiveness includes the capacity of the apparatus to perform a certain task.

Convenience embraces the various novelties and appurtenances added to an appliance for the convenience of the consumer.

Extended hire purchase terms render it necessary to supply articles of sound construction, and the fourth factor, durability, must therefore be given a place.

The fifth factor, ease of maintenance, resolves itself into seeing the appliance from the fitter's point of view. A little forethought on the part of the manufacturers often lightens the task of the maintenance man considerably and this aspect therefore receives due attention in the design of appliances.

Finally, there is the question of the cost of the apparatus, a factor which is of paramount importance, and which is under the continuous review of the manufacturer.

Factors in appliance design and construction may be briefly summarized as follows:

A.—Appearance. Appearance sells appliances.
B.—Behaviour. (1) Efficiency.
(2) Effectiveness.
C.—Convenience.
D.—Durability. Important in view of extended hire purchase terms.
E.—Ease of maintenance.
F.—First cost.

Manufacturers who spoke at the Joint Gas Conference stated that the competition which existed in the Industry had reduced prices to the lowest possible level, bearing in mind the cost of materials and labour. In addition to the actual cost of materials and labour, manufacturers are faced with considerable overheads by reason of the service they render to Gas Undertakings by the provision of publicity matter, displays, exhibitions, demonstrations, advertisements in the technical and popular press, and other charges.

These services are rendered in the best interests of the Gas Industry, and if the present efficiency of the Industry is to be maintained, they must either continue to be paid for by the manufacturer, or the Gas Undertakings would be faced with further expenditure under these heads.

It may be unnecessary for me to state that the gas appliance which is purchased at the lowest first cost is not necessarily the most economical apparatus to fix on a consumer's premises.

In choosing apparatus, I suggest full consideration should be given to the six factors in appliance design and construction, which I have enumerated.

Mr. C. A. Masterman stated at the Birmingham Conference—

> "I distrust over-emphasis on cheapness of appliances since this may defeat its own object in creating higher complaint and maintenance costs."

Each Undertaking should have precise information as to the cost of maintenance of the various types of appliances they have in use. Manufacturers have, in recent years, devoted considerable attention to the design and construction of those component parts of gas appliances, which past experience has shown to give rise to complaints and expense in maintenance.

There is, therefore, a limit to the real economy which may be obtained by cheapening certain parts of an appliance, as such cheapening undoubtedly leads to ultimate increased cost in maintenance as well as to annoyance to the user of the apparatus.

Standardization.

In the Papers presented at the Birmingham Joint Conference many speakers referred to standardization of appliances. Mr. Currier suggested that fires, radiators, and portable heaters should be constructed to a standard agreed by a panel of experts representing suppliers and buyers, which, in his opinion, would result in prices of appliances being reduced and brought down to the absolute minimum.

My own view on this point, from a close study of the problem, is that no very great reduction of prices would follow the adoption of such a policy, even if it were possible to obtain the necessary agreement by all the manufacturers.

I have expressed the view on several occasions that the form of standardization which will prove of most value in promoting the domestic load is not that which involves the laying down of close specifications of performance, materials, and design, but rather the avoidance in a given design of individual requests for slight modifications. Such alterations are costly and defeat the effort made to keep down costs by bulk production. For every manufacturer to make the same type of appliances would put an end to progress.

Mr. Potterton, in dealing with the cost of water heating appliances, stated that standardization of patterns between manufacturers might lead to a higher standard charge.

In conclusion I must emphasize that there are so many aspects of the domestic load capable of consideration that it is impossible to review them all in the short time available.

Although many of my observations on the subject of this Address are not new, they may not be considered out of place in reviewing the important problem of the domestic load. I have indicated certain aspects which may be considered controversial and upon which district discussion will, I hope, make for general agreement.

The importance of the subject, however, fully justifies the time taken at the recent Joint Gas Conference at Birmingham and at this Conference to-day, and I trust it will be taken up with enthusiasm by the District organizations, whose time and study will be amply repaid.

THE B.C.G.A. CONFERENCE PAPERS

Heat, Health, and Happiness

by
Lord HORDER,
G.C.V.O., M.D., B.Sc., Hon.D.C.L., F.R.C.P.

You will, I am sure, forgive me if I open this short Address by saying something which may seem a little ungracious. But you know me well enough to expect frankness. I am not here because I am interested in the prosperity of the gas companies affiliated to the British Commercial Gas Association. I do not think you did me the honour of asking me to come here for this reason. I think you asked me because you thought there was an overlap of your activities as the purveyors of warmth and light and heat for cooking and mine as a doctor who holds a fairly wide view on matters that affect the health and happiness of the people. You had confidence in this fact and you left it to me to decide if I agreed with you. My presence here tells you that I do. I am not interested in you merely because you are a successful Industry. I am interested because this fact enables you to perform several functions in relation to the well-being of the community which both you, and I, and all really intelligent people live to serve.

"This England" of ours is a quaintly individualist country. A good many things which in other countries are left to a central bureau are done here by the people themselves as the result of their own initiative. And they are sometimes done very well. You are, I believe, examples of successful business concerns which combine public benefits with private enterprise—you are able to supply some of the basic needs of the less well-to-do people because you have a solid backing of business experience and have achieved very considerable business success.

Interesting the Doctor.

You are right in thinking that, as a doctor, your commodities interest me. I am, of course, vitally interested in preventive medicine. By that I mean that I am interested in our people being well, not in their merely not being ill. But you know as well as I do that we are only "talking through our hats" if, whilst proclaiming public health, we do nothing to put the *means* of health within the reach of our poorer folk. And by our poorer folk, by the way, I do not mean only those with the least money, I mean also those whose incomes, already below a certain level, tend to become eaten up by heavy, but essential, charges before their most fundamental needs of all, their food, can be purchased. For these people, as I have so frequently insisted, "keeping fit" is not a matter of teaching them exercises, it is primarily a matter of shelter, of warmth, of fresh air, of sufficient food, and of reasonable security about these things.

Now you tell me you are out to sell *warmth*—good, clean warmth—and to sell it cheaply. I am not quite sure what you mean when you speak of a "rationalized fuel system," but if this means that you provide a mode of giving warmth which liberates money that would otherwise be spent on cleaning and on storing fuel, so that even a few shillings a week are saved for food, your claim to reasonableness is more than justified. If you do this you make us doctors less ashamed of talking to people about "balancing their diets" when half the time they haven't got the wherewithal to purchase the articles of food we recommend.

But you do more with your heat than merely warm people; you enable them to cook and wash. And I happen to know that you sell intelligence to housewives as well as heat. People who ought to know tell me that your Home Service is of great practical use. This service encourages housewives to be kitchen-conscious and it helps them in their efforts to be clean. And I like to know there are women at the head of this Service. Indeed, what you are in effect doing is to help people make *homes*, and I can think of no better contribution that any one of us can make to the health and happiness of his fellows than this. This is the best sort of education.

I happen to be very interested in Eugenics. But the more we study eugenic problems the more certain it becomes that these cannot be entirely separated from problems of an environmental kind. The home conditions of the raw material of humanity are a fundamental requisite if we want to give good human stock a chance. As a friend of mine once said in this connexion: "*It isn't much good trying to implement our theories on heredity if the stud farm is a slum. . . .*"

Then I know also that you have a sideline in Housing Research, and I want to congratulate you upon Kensal House, of which I am an admirer. That was a great idea, even if it did begin as a business idea. It is said that Napoleon called us a nation of shopkeepers, but we often forget that he added that it was odd that we seemed ashamed of the fact. There are some businesses of which anyone might be proud and you may surely be proud of a business that produces Kensal House.

But your concerns interest me as a doctor in more direct ways than in this matter of making homes possible for the people who would otherwise not have them. I am at present deeply involved in the problem of Rheumatism. We have started an Empire Rheumatism Council whose object it is to track down the causative factors in the production of this series of painful and disabling diseases, and to combat these factors by appropriate measures, always remembering that prevention is better than cure. Judging by the enormous number of panaceas that the post brings us—week by week—everybody seems able to cure Rheumatism—except us doctors. But we shall never get our treatments properly "taped" until we get our causes fully known and, even then, in all probability, it will be much more a matter of control than of cure. "Cures" are dramatic and therefore make a great appeal to people's imagination, but "control" is a much sounder thing and is what preventive medicine aims at. Well, we do know some things about Rheumatism; we know, for example, that in this queer climate of ours the supply of dry, clean heat gives the purchaser a weapon of tremendous power against the ills (and Rheumatism is not the only one of these) that result from damp and cold. So this is another reason why I am here this morning.

The Open Hearth.

And now I must make a personal reference. A good deal of comment—and some play—was made in reference to something I said recently about the hygienic value of the "open hearth." Well I have no reason to retract anything that I said on that score. The comfort of an open fire is undeniable, and this institution, which is peculiarly British, is both healthy and enjoyable. But everybody can't have it, and it has disadvantages, although, as I pointed out, these could be greatly reduced if people took a few pains to do so. Most of the comforts of life have some disadvantages. Life is like that. But I saw an open fire of a different kind, in Kensal House: an intelligent affair; it was lit by a sort of gas poker—if you will forgive such a technical inexactitude. This fire gave out a nice, warm glow and it lent a cheerful aspect to the whole room. If I remember rightly its posterior served some useful function in the direction of cooking or water heating.

I am not going to enter into a controversy over this matter, since I find nothing incompatible between what I said about the open hearth last year and what I am saying here to-day. And I take it for granted that whether it be the open hearth, or the gas or coke fire, the source of heat is British coal.

Another and even more direct contribution you are making to Health is, of course, in the matter of smoke abatement. The evils that follow the pouring out of carbon and sulphuric acid into the atmosphere—and here again we must remember our humid climate, which greatly intensifies these evils—are familiar to us all. And there are the enormous economic losses, too, entailed by fog and dirt, though these are not my concern as a doctor. Whether these nuisances are, in the gross, caused more by industrial, or by domestic fires (concerning which there is much argument) doesn't affect the position much. The fact remains that you are making a very large contribution towards keeping the air pure by supplying to the people fuel that has none of these evils debited to its account.

There is another aspect of this matter of fuel that interests us at this present time: smoke is wasted fuel in addition to being atmosphere pollution and to certain types of mind waste is as great a crime as poisoning.

At a time like this, when every asset of our material life comes under review, and especially food and fuel, we must think more seriously about the waste question than we have done heretofore.

I do not propose to trespass on the sphere nor upon the time of your experts to tell you what actually that wastage amounts to: the Smoke Abatement people have, I know, reiterated these damning figures in their admirable propaganda literature. But this is an added reason why I, as a doctor, commend any development of rationalization that will help to control both the poison *and* the wastage.

I hope I have justified myself in accepting your invitation to address your Conference. As I told you, I am not very concerned with the fact that you are, as I believe you are, prosperous. So are armament makers prosperous. I haven't any shares in any of your companies, I rather wish I had. Certainly I have no moral grounds against investing in your business, and in the case of armament makers I am not quite sure that I haven't. On the contrary, since you use your prosperity with such intelligence, if I had some shares I should still sleep well, with the knowledge that I was, through you—and as long as you continue to sell clean heat cheaply—doing " my bit " towards helping my fellows.

And so I wish you a good year ahead. If you continue to have that vision without which the people perish, you will continue to earn our respect and our thanks.

Market Information and Sales Development

by
JOHN P. G. DOWMAN, F.S.S.

This subject is one of prime importance in business management, and therefore of great interest, not only to individual undertakings, but to the Gas Industry as a whole.

Most of you here to-day are business men of long experience in the Industry, who need no convincing of the fact that market information is an absolute necessity in these days of highly intensive competitive selling. This information, relating to many different aspects of your business, can be obtained whenever required in your areas, and many of you have recognized the real value of it. I would like, nevertheless, to say a few words to those of you who are as yet not so convinced in this matter.

We all know that in making decisions, there are two things primarily on which a man must depend—his knowledge of facts and the judgment of his experience. Capacity for sound judgment, especially in applying his decisions, is a highly important and indeed essential quality in a business man. But in the making of these decisions, it is judgment based on facts, that must always stand the best chance of success, where judgment alone may fail. However intelligent he may be, a business man who relies entirely on his past experience, cannot be right all the time. He may frequently come near to it, but the chances of his doing so consistently, are very small indeed. Moreover, the degree of accuracy of his decisions is likely to be far greater if they are based on a knowledge of carefully ascertained facts, than if they are dependent solely on his own unaided judgment.

It is this higher standard of consistency and accuracy in the making of decisions on which may very largely, if not entirely, depend the success of any commercial business; especially if it is one that is engaged in a highly competitive field. The losses resulting from wrong and inaccurate decisions—that is to say, through errors of judgment on the part of executives—should somehow be reduced to an absolute minimum.

There is only one way by which a business can very largely insure against these losses. It is by taking every step possible to provide those responsible for its policy, with full and reliable information bearing on the problems with which they have to deal.

The collection of this information—if necessary from outside sources—and the subsequent analysis and interpretation of it, is the process known as Market Research.

Information of the kind that is usually required for sales development purposes may have to be obtained externally by means of a market enquiry, or it may be already available in the internal records of the undertaking. Before referring to an interesting system that is being adopted in the Industry, to piece together this external and internal information, I would like to say a few words on the subject of field investigations.

It is essential that all Market Research work be done with absolute thoroughness and that it be most carefully supervised from start to finish. Correct methods must be adopted in the preliminary planning of every outside enquiry. Field investigators must be properly trained and competent to do their work efficiently, and, especially in dealing with facts that concern competitors' activities, there must be absolutely no bias or prejudice in the subsequent interpretation of the information obtained. Market Research that is not conducted in conformity with these standards will yield results that are worthless. It is of the greatest importance that the executive, who is primarily concerned with the results of a market investigation, should be able to feel assured in his own mind that the facts collected are both accurate and reliable, and that the statistical analysis of them has been done correctly.

Static Information.

While fully recognizing the value of market surveys, which is the only method of obtaining information for certain specific purposes, it must be realized that the kind of information they normally result in, has one inherent weakness. It is *static*. That is to say, it presents to us a stationary picture of certain facts as ascertained at the time, or during the period, the enquiry or survey was made.

Now a market is a continuously changing scene. It is in a perpetual state of flux and movement. What is true of it to-day, is not necessarily true to-morrow. It follows therefore, that the information contained in a Market Survey Report normally begins to lose its accuracy-value from the time it is prepared—or, strictly speaking, from the time at which the facts it presents were collected. In other words, it offers us what may often have to be considered as highly perishable information.

Would it not be much better, therefore, if an undertaking could have what may be described as a " continuous motion picture " of the outside market, illustrating the changes which in fact are taking place all the time? And above all, presenting a record of fact that is *continuously accurate*.

Several undertakings, who have realized the need for some-

thing of this kind, are laying the foundations for it by introducing what is known to some of you as Census Schemes.

It is unnecessary for me to describe to you the working details of these schemes, as you will have had an opportunity before leaving Brighton, to study the Census Scheme methods that are being adopted in this area.

The purpose of the Census Enquiry is to obtain from every property-holder or occupier, information on a number of points that are likely to be of direct or indirect interest to the undertaking, in connexion with its future selling activities. The information obtained through this original field survey is immediately transferred to a card-index system installed in the undertaking's offices, where it is classified by streets and districts.

From this point, the census card becomes a continuous record of all subsequent information that refers to the property it concerns. By a system of daily posting, the details on the card are kept up-to-date.

Now there are certain features of these Census Schemes which are of particular interest.

In the first place, the Census Scheme method is equally practicable for all undertakings, irrespective of their size. Secondly, if special methods are adopted, there need be no prohibitive expense, either initially in obtaining the Census information, or subsequently, in maintaining the internal index-card record. And thirdly, as an item included in the question of initial cost, there is no absolute necessity for the employing of additional staff to act as Census investigators. It is even preferable, for certain reasons, that this work should be carried out by your own permanent sales staff.

Initial Expense not Prohibitive Consideration.

To illustrate to you that initial expense is not a prohibitive consideration, let me cite the method successfully adopted by one undertaking, who were probably one of the first to introduce the Census Scheme System. They carried out their Census Enquiry, or part of it, in conjunction with an intensive Sales and Publicity Campaign. The increased business that resulted from this campaign more than covered the cost of obtaining the Census information. Why should not similar methods be adopted successfully in your own area?

I must mention here very briefly one of the outstanding advantages of the Census Scheme System. By referring to his Census record cards, the salesman is able to ascertain at any time precisely what sales possibilities exist in any individual property, and what prospects there are for additional sales in every property, street and district in the area. This knowledge must result in a tremendous economy of his time and efforts. His former methods were of the hit-or-miss variety. He now knows where he is most likely to score a hit.

Consider also the advantages of this system of continuous sales records from the statistical aspect. Sales information, for whatever purpose it may be required, must be continuous to be of any real value. An isolated sales figure has little or no significance until it is given in conjunction with some other figure or figures to which it should be related.

It is not sufficient, for example, to know that two hundred and fifty appliances of a certain type were sold in a particular district during the month of April. This figure, if taken alone, is not so significant as if it is related to the numbers of the appliance that were sold during each of several preceding months in the same district. Similarly, your sales and installation records may tell you that 200 domestic water-heaters are in use in your area. It is perhaps interesting to know this. But, is it not of far greater value, for practical sales-promotion purposes, to know that of 2,750 registered domestic properties in your area, *only* 200 have so far installed your water-heater? This is a rather crude example, but it illustrates my point, that the full value of much numerical information is obtained only when figures are presented in relation to other figures on which their real significance depends.

A system of continuous information concerning sales is therefore essential. In other words, what is wanted is a picture of trends showing you at once the changing levels of sales activity in general, and illustrating monthly, weekly, or even daily if necessary, increases and decreases as they occur.

If properly planned and maintained, the system of internal records, of which the Census Scheme is the foundation, will enable you to obtain a statistical picture of many items that are of importance in your business. I need not emphasize what a great advantage it would be for an undertaking to be able to see at a glance at any time how its current business prospects stand in relation to the various domestic loads. It is obvious that this information, if continuously available, would greatly assist undertakings to plan their sales development drives for any particular class of business on which there appears a need to concentrate; and, in the process of doing this, to eliminate all wastage of effort.

It may be of interest if I refer for a moment to the excellent system of records that has been in use for many years in the associated concerns of the American Telephone and Telegraph Company—one of the largest public-utility organizations in the United States. These companies maintain a complete statistical record that illustrates continuously every aspect of their business. Executives are able to see immediately where increases and decreases have occurred, and, what is important, to see the size or extent of these changes in their true perspective and relationship to the rest of the business. With this and other information available, they are in a position to decide at once what administrative action should be taken to avoid a further decline in any section of the business, or, as would be the case in your Industry, further loss of ground to competitors.

I am not suggesting that any attempt should be made to introduce such a comprehensive statistical system in the British Gas Industry, for the simple reason that I do not think there is an absolute need for it. But I am convinced that it would be a very excellent thing if some further building were done on the statistical foundations that already exist in many undertakings throughout the country.

This suggestion applies to all undertakings, large and small, and irrespective of the particular local conditions under which many of you are operating. It is for you yourselves to decide how far statistical methods of dealing with information can be of really practical value; and the extent to which you can utilize these methods to keep you in constant touch with the details of what is happening, both internally in your undertakings and externally in the market of your area.

Distribution of Information.

Before concluding, I would like to suggest how important it is that the internal distribution of Gas Industry information should be organized as efficiently and extensively as the Industry's external publicity activities. At present, there are several groups of undertakings who collaborate by the reciprocal interchange of operating information. There is also, I believe, a fairly systematic interchange of technical information, mainly within these groups.

If the relatively few undertakings in these groups derive benefits through this practice, would it not be to the advantage of the Industry as a whole if information on both technical and non-technical subjects were regularly circulated to all undertakings?

The successful experience of others is always interesting and can often prove immensely valuable in dealing with our own problems. Why should undertakings be continuously handicapped by certain problems if these problems have been successfully solved by others? If, for example, certain selling methods have proved particularly successful in one area, is it not very desirable that they be suggested to the Industry at large? It cannot be expected that information generally circulated will be of value or interest to all undertakings—but if it is of value to some and of interest to others, its circulation has been well justified.

Some service along these lines is already being rendered to the Industry by the B.C.G.A. But might I offer the suggestion that, with your co-operation, this service can be even further developed to the Industry's advantage? The more information you can supply regularly to the B.C.G.A. on the subject of your operating activities, the better will they be enabled to fulfil their function and responsibilities as your central organization.

I would like to thank you all for your patience in hearing me this morning, and to express my good wishes to the Gas Industry for the continuance of its prosperity.

A.D.1939

A modern kitchen interior illustrating one of the foremost cookers of the day.

No. MAIN 527

STREAMLINED GAS COOKER

See our Stand No. 116 at The Ideal Home Exhibition, Earl's Court April 11—May 6.

R. & A. MAIN LIMITED, LONDON & FALKIRK

SEASIDE SERVICE

BY MR. THERM

Sidelights on the Commercial Activities of our Hosts at the B.C.G.A. Conference

FEW of the delegates to this week's Brighton Conference of the British Commercial Gas Association are, we suppose, unfamiliar with this perhaps most famous of England's watering places; but possibly the majority know less of the activities of the Gas Undertaking which ably serves a hundred square miles of Brighton and its environs. The "JOURNAL" takes this opportunity of giving an account of some of the methods whereby the Brighton Hove and Worthing Gas Company keep the banner of gas flying over so extensive a span of the Sussex seaboard and its immediate hinterland. Of necessity our review must be but a cursory one; but it will, we hope, suffice to indicate that the Undertaking in whose midst the delegates have spent a few days this week is moving abreast of the times.

Historical.

BRIGHTON was originally supplied with gas by two companies—the Brighton Gas Light and Coke Company, formed in 1818, and supplying gas from works at Black Rock at the eastern end of the town; and the Brighton and Hove General Gas Company, formed in 1825, and supplying gas from works at Hove. Both these works are now only gasholder stations of the present Company.

In 1860 the consumption of the Brighton and Hove General Gas Company was 110 million cu.ft. per annum. By 1870 this amount had doubled, and it became necessary to construct a new works. Accordingly, the Portslade Works were built on a strip of reclaimed land between the sea and the eastern arm of Shoreham Harbour. It is interesting to note that these works now cover 38 acres, the output being over 3,000 millions per annum.

In 1882 the Brighton Gas Light and Coke Company was absorbed by the Brighton and Hove General Gas Company, and by 1885 the entire district was supplied from Portslade—the annual output then being 750 million cu.ft. In 1931 the Worthing Gas Light and Coke Company was acquired, and the title changed to the Brighton Hove and Worthing Gas Company. Three years later the Littlehampton Company was also absorbed. The gas-works at both Worthing and Littlehampton have been closed down and the make transferred to Portslade, whose present maximum potential output per diem is 10 million cu.ft. of coal gas and 5 million cu.ft. of carburetted water gas.

The Portslade Works.

DURHAM coals only are carbonized at Portslade, the present consumption being about 200,000 tons per annum. All coal is seaborne in steamers carrying up to 1,400 tons. Discharge is effected by two cranes mounted on an elevated steel gantry, each crane having a capacity of 45 tons per hour. The coal is fed on to a 24-in. rubber belt conveyor of 90 tons per hour capacity equipped with a Blake-Denison weigher. It is noteworthy that the original belt carried 900,000 tons of coal before renewal was necessary.

From the conveyor the coal passes through two crushers, from which it is elevated and fed on to belt conveyors running the entire length of the three retort houses, the coal being delivered into overhead bunkers as required, or alternatively direct into store, by-passing the crushers. The retort house bunkers are of reinforced concrete and have an aggregate capacity of 2,500 tons, while the coal stores can accommodate a further 23,000 tons.

No. 1 Retort House contains 20 beds of regenerative settings having a capacity of 4 million cu.ft. per diem. The settings are equipped with three Spencer-Bonecourt waste-heat boilers with a total steam-raising capacity of 8,000 lb. per hour, or 600 lb. per ton of coal carbonized.

No. 2 Retort House is similar in general dimensions, capacity, and arrangements of the settings. The "Le Fleuve" system of coke quenching and conveying has recently been installed in this house, and it is proposed to convert No. 1 Retort House to the same system.

No. 3 Retort House contains ten settings fitted with two waste-heat boilers, and has a capacity of 2 million cu.ft. per diem. Provision exists here for the future addition of a further nine settings.

The Carburetted Water Gas Plant consists of five Humphreys & Glasgow sets with an aggregate capacity of 10 million cu.ft. per diem. Nos. 1 and 2 sets are fitted with self-clinkering generators, automatic operation, the back-run process, and the recording pyrometric method of grate control. No. 5 set is adapted for the production of producer gas, using breeze as fuel. All sets are fitted with waste-heat boilers which, together with the generator annular boiler, evaporate 100 lb. of steam per 1,000 cu.ft. of gas made.

Coke Plant.

THE coke plant consists of ranges of large reinforced concrete bunkers above which is very complete cutting and screening plant designed to deal with 75 tons per hour. The storage capacity of these two plants amounts to over 2,000 tons of coke and breeze, the outlets of the hoppers being fitted with debreezers which feed the coke into Belle Isle weighing machines on the loading platforms.

In addition to the usual ancillary plant, the Portslade Works generates all its electricity requirements by means of triplicate sets of Browett-Lindley vertical compound steam engines coupled to a 250 kW dynamo, supplying D.C. at 220 volts.

A battery of Holmes rotary brush scrubbers is installed on the outlet of the works for the purpose of benzole extraction and naphthalene removal. This plant is capable of dealing with 12 million cu.ft. of gas per diem, and the quantity of benzole at present being recovered amounts to over 670,000 gallons per annum, representing 3½ gallons per ton of coal carbonized.

The works are complete with laboratory, first-aid room, fire station, workshops, and canteen, and it may be mentioned that extensive work is being carried out in connexion with air raid precautionary measures.

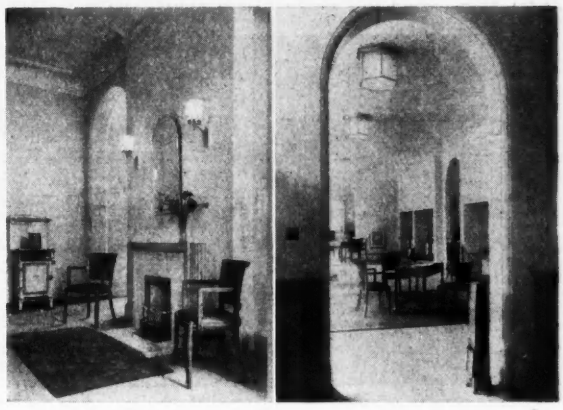
There is no storage at the Portslade Gas-Works, the gas being boosted to holder stations at Hove, Black Rock, and Worthing. At the first two holder stations storage exists for just over 5½ million cu.ft., while at Worthing, Goring, Littlehampton, and Rustington an additional stock of 1½ millions can be held, making 7 millions in all. Additional storage is now in course of provision at Worthing, construction of a 1¼ million spiral-guided holder having been commenced.

From Littlehampton a trunk main provides a bulk supply to the Arundel Gas Company.

Sales and Service.

TURNING now to the sales side of the Company's activities, mention should first be made of the showrooms. There are six of these—two in Brighton and one each in Hove, Shoreham, Worthing, and Littlehampton. Four of these have commodious demonstration theatres where regular lectures and demonstrations are given. The latest of the Company's showrooms is that at Littlehampton—a fine example of modern practice, which was described at the time of its opening in the "JOURNAL" for Oct. 6, 1937. The accompanying illustrations give a glimpse into these attractive premises. If the other showrooms are not, perhaps, quite so up-to-date as that at Littlehampton it can at least be said that they are all spacious and well suited to their purpose—though we understand that the Company have in view their modernization as soon as practicable.

A site behind the Church Street showrooms has already been reserved for the erection of a stores and fittings centre, which will relieve the pressure on the accommodation at Head Office; the latter will then be used solely for administration purposes. While mentioning Head Office, we might add that the frontage in 77, West Street, is genuine Georgian period, and is, indeed, the only original frontage now remaining in the street.



Two Views of the attractive Showrooms at Littlehampton.

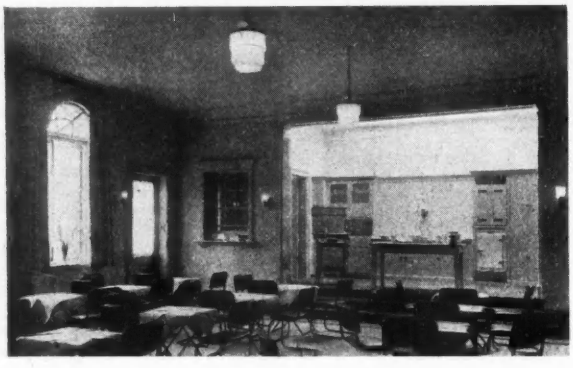
Canvassing.

FOR general sales and canvassing purposes the Company's area is divided up into 38 districts, each of which contains between 2,000 and 3,000 consumers. One member of the sales staff is in charge of each district, calling upon consumers and making himself responsible for all sales matters with the exception of specialized jobs such as central heating and catering installations. His business, in short, is to make what may be termed "service-cum-census" calls, so that any complaints not serious enough to be reported by the consumer can be attended to, new sales made, and all

An Aerial view of the Portslade Gas-Works

appliance records kept up to date. Personal letters are sent to consumers advising them of the forthcoming call.

Special attention has always been paid to an efficient record system, and a card scheme has been developed embodying the use of a Powers-Samas machine. By this method it is eventually aimed to have a permanent record of all appliances on the district, which not only assists in service and maintenance work, but is particularly valuable when carrying out selective canvassing. As an example, the Company recently had a "drive" to replace old black cookers by an all-enamelled model with thermostat which they offered on seven years' hire purchase at a cost of 1d. per day fixed complete. The Powers-Samas machine quickly ran through the record cards extracting all those which showed the existence of a black cooker, and appropriate leaflets, setting out the new offer, were mailed to each consumer concerned.



The Demonstration Theatre at Littlehampton.

As a result of this initial black cooker campaign two consumers out of every nine circularized accepted the new offer. All the district men carry with them copies of the record cards relative to the consumers in their districts, so that easy reference can be made to all appliances in the house.

It may be mentioned that all non-sales employees are eligible for a prospect card scheme under which commissions are paid in respect of appliance sales thus introduced. There is now instituted, further, a Commission Scheme to embrace all salesmen.

A Scheme for Builders.

A SPECIAL department is maintained to deal with builders up to the time the house is occupied, after which the sales approach comes under the jurisdiction of the district salesmen. The Company have two alternative offers which they make to builders. In the first the builder pays a deposit representing the full cost of the main laid to serve the houses he is putting up. The builder has to put in the services and five gas points (capped off) in each house; and then, as each house becomes occupied and the occupiers begin to use gas, the builder receives back the proportion of his deposit represented by each house. Thus, when every house is occupied —and if every occupant has become a gas consumer—the builder has the whole deposit refunded. It is therefore in the builders' own interests to ensure that every occupant becomes a gas consumer—and it may be added that the proportion of deposits forfeited is infinitesimal.

Under the second scheme, if the builder provides at his own expense gas appliances at any of the five points the Company will lay the main without requiring any deposit. The Company also co-operate with builders by supplying appliances for their show houses and by floodlighting their sign-boards—with a special reduction in rates if Mr. Therm appears on the boards. Special terms are also offered, of course, to builders who carcass flats during erection.

Large-Scale Business.

TWO salesmen devote their whole time to calling upon hotels, boarding houses, restaurants, and catering establishments generally. They work on a system of close personal contact with the proprietors of such establishments, and in a resort such as this, where almost every caterer uses gas in greater or less degree, their task is no light one.

Among recent installations of interest may be mentioned the new Ocean Hotel at Saltdean, which has an all-gas kitchen, while the well-known Tudor Close Hotel at Rottingdean also uses a considerable number of gas apparatus, with the added distinction of having one of the very few fish-friers which have been converted from electricity to gas. Among other catering establishments there is the restaurant of the Sports Stadium—"S.S. Brighton"—another change-over from electricity to gas. The kitchen attached to the Shoreham Airport restaurant is also all-gas.

The central heating business is rapidly developing under the stimulus of an active sales policy with gas at 33% discount. There are two fully qualified heating and ventilating engineers on the permanent staff, who, assisted by specially trained men, deal with all central heating and hot water installations other than single-point appliances. The volume of central heating and bulk hot water supply business now accounts for a load of some 50 millions per annum, and recent installations of interest include such premises as the Tivoli Cinema, the County Lawn Tennis Club, Marks and Spencer, the Southern Publishing Company, a large motor showroom and garage, a furniture store, a cellulose spraying shop, and the Congregational Church at Littlehampton. These, it will be admitted, represent sufficient diversity of application; and the greater number of these installations have been added during the past two years.

Maintenance.

COMPANY-OWNED appliances are visited regularly according to a service schedule, while maintenance contracts are also available to those who own their gas apparatus.

The sales and service staffs are given every encouragement for training. They take the B.C.G.A. Courses, interspersed with technical training, after which they join the B.C.G.A. Discussion Groups. There is also a comprehensive scheme for training fitters, including the training of maintenance fitters so that they will eventually be able to service *all* domestic appliances in one call. It may be recalled that the Company originally employed the services of dealer canvassers. Their own staff has now, however, been sufficiently enlarged and trained to enable the Company to dispense with dealer co-operation, the only form of which now in existence being a number of retailers who sell gas refrigerators by arrangement with the Company.

Optional Two-Part Tariff.

AS from the beginning of the present year the Company are offering to domestic consumers an optional two-part tariff. The standing charge is based upon the consumer's maximum monthly consumption over a period of not less than twelve months, it being contended that the maximum demand of each consumer determines how much plant must be kept in readiness to satisfy it. The scale of standing charges is as follows:

Maximum Monthly Consumption During Past 12 Months.		Monthly Standing Charge.
Therms.	Cu.Ft.	s. d.
up to 10	2,000	3 0
10 to 15	3,000	4 4
15 to 20	4,000	5 3
20 to 25	5,000	6 2
25 to 35	7,000	8 0

There are two additional steps up to 50 and 75 therms per month; these come within the discount earning group, and the offer is now being extended to this class of consumer also. After payment of the appropriate standing charge all gas is charged at half-price.

Home Service.

CONSIDERABLE importance is attached to Home Service, and in addition to the regular demonstrations already mentioned, it is the policy of the Company to follow up new cooker consumers with a Home Service call. The Chief Demonstrator also organizes the meetings of the

local branches of the Women's Gas Council at Brighton and Hove, Worthing, and Littlehampton—the total membership of which exceeds one thousand. The demonstrators make a point of tying up their lectures with any particular sales campaign that happens to be running, while they also offer assistance in kitchen planning, give talks to local women's organizations, and judge various domestic competitions.

Interesting programmes are arranged in the Autumn and New Year, when attractive booklets are distributed to housewives—containing a timetable of the lectures and demonstrations together with subjects, with blank pages at the back for jotting down recipes. These programmes are definitely "something different" from the more usual run of cookery lectures; they include such items as menus for parties, invalid cooking, and recipes from other countries. There is also a "Request Week," during which housewives are invited to exchange recipes.

Publicity.

AN up-to-date conception of publicity ranks high in the Company's policy. The guiding principle is to break the year up into campaigns which are linked up with special publicity efforts rather than to advertise continuously throughout the year. It is considered that in this way the individual campaigns carry greater weight.

The usual method is to utilize the best local newspapers for displayed advertisements, accompanied by editorial matter; this is supported by booklets, broadsheets, and stuffers which are despatched to consumers, by solus and semi-solus posters, window displays, and appropriate tie-ups in the way of demonstrations, during which films are sometimes employed.

The Company attach considerable importance to direct mail publicity, and special classes of professional men are periodically approached in this way. Publicity at the moment is being given to the new two-part tariff, which, incidentally, is going very well. It is proposed to link up the tariff with a water heating campaign, using the slogan "Change to Automatic Hot Water on Half-price Gas."

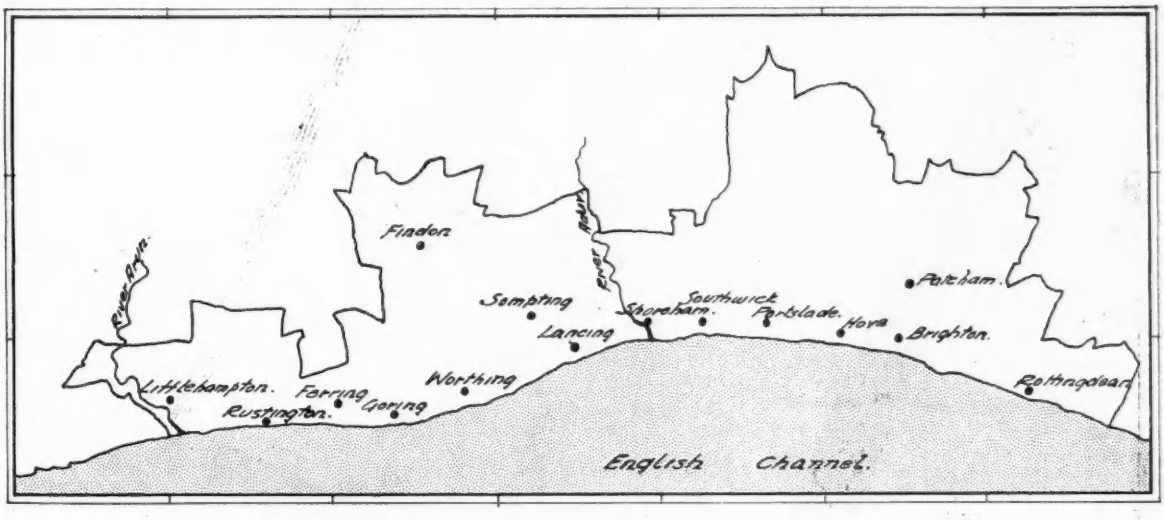
The Function of Advertising.

THE Company's views of the function of advertising are, first, to bring direct sales through the showrooms, and, secondly, to provide a background for the salesman. Their publicity policy generally may be summed up in a few words: "We want our advertising to do more than sell gas and gas appliances. We want the public to think well of the Company; and we must not overlook the social value of the service we have to offer." Developments are now taking place which will enable the Company to give greater emphasis to Public Relations, by closer contacts with schools, clubs, and social organizations.

While most of the advertising appropriation is naturally allocated to gas, some proportion is devoted to gas coke—particularly to the development of the sales of gas-ignited coke grates. In this connexion there is a special campaign in the Autumn of each year. The advertising policy as a whole is directed towards specific appliances at specific prices. An average figure has been arrived at which enables fixing prices to be quoted for all normal installations—so that the prospective purchaser can see at a glance just what any appliance is going to cost him, fixed complete.

WE have endeavoured in these notes to give a broad survey of the activities of the Brighton Hove and Worthing Gas Company—not with the object of holding them up as an example to others, for they would be the last to suggest that their systems are by any means perfect—but rather to indicate that our hosts at Brighton are fully alive to the need for a go-ahead policy in these days of keen competition and are doing their best to translate that policy into practice. In Brighton, in fact, there is a full appreciation of the meaning of—

"MODERN GAS SERVICE."

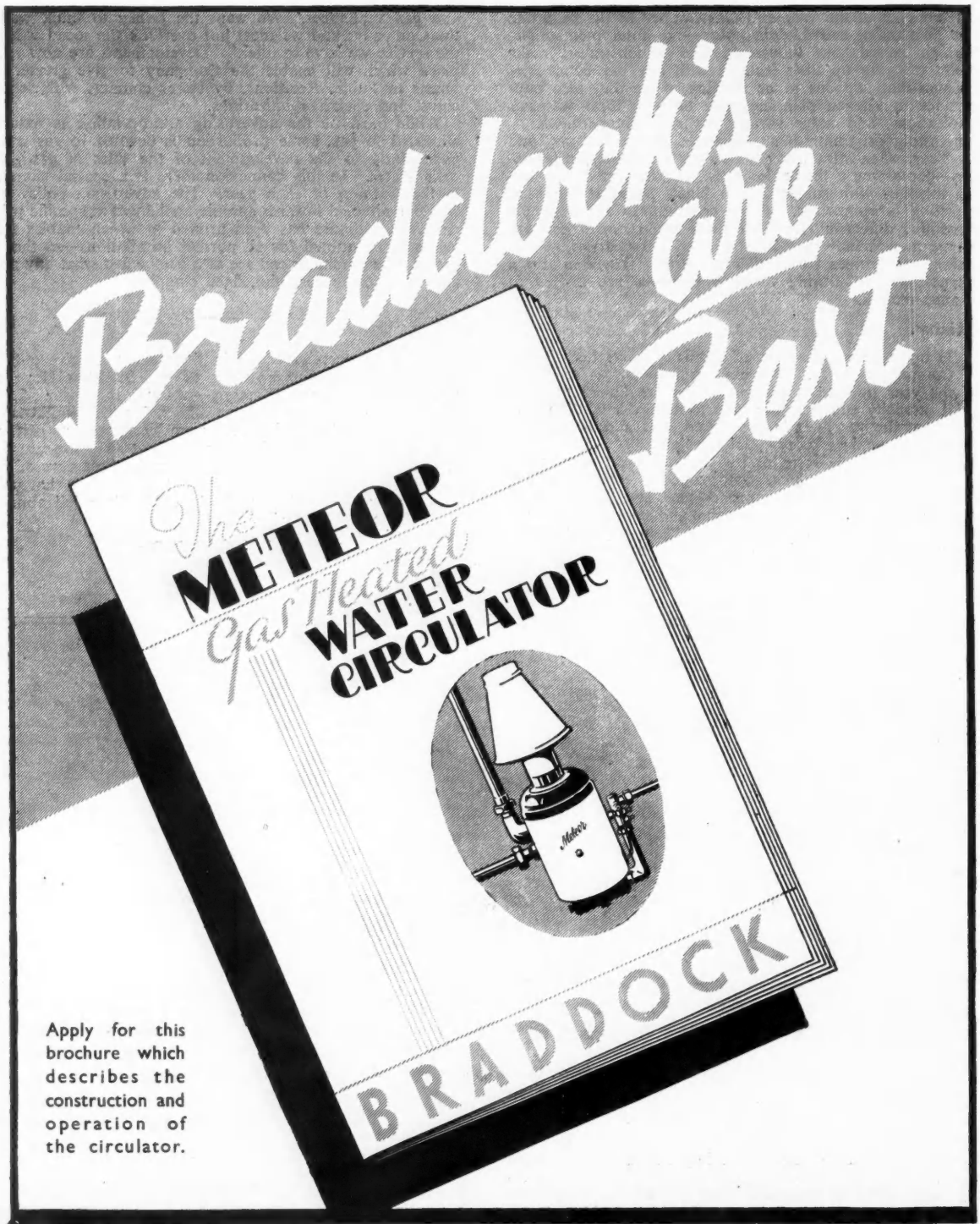


Parliamentary Area of Supply of the Brighton Hove and Worthing Gas Company.

— FACTS AND FIGURES —

relating to the Brighton Hove and Worthing Gas Company

Number of Consumers	92,000
Area Served	100 sq. miles
Annual Output of Gas	3,100 millions
Coke Sales	92,000 tons
Benzole Recovered per Annum	670,000 gall.
Calorific Value	500 B.Th.U.
Coal Carbonized	200,000 tons
Capital	£2,013,128



Apply for this brochure which describes the construction and operation of the circulator.

J. & J. BRADDOCK

(BRANCH OF METERS LTD.)

45/47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1

Telephone : Waterloo 4412

GLOBE METER WORKS, OLDHAM, AND 49/51, ABLOW STREET, WOLVERHAMPTON

Telephone: Main 3815 Telephone: 23189

AN EXHIBITION OF B.C.G.A. SERVICES

Every housewife has a Problem
GAS
Solves your Hot Water Problem
GAS WATER HEATERS
GIVE YOU STREAMING HOT WATER INSTANTLY

A presentation of the B.C.G.A. Publicity Services in connexion with the Annual Conference at Brighton was seen for the first time in the form of a small, yet modern, Exhibition at the Royal Pavilion.

THE central attraction was a 31 ft. long panel dramatizing Home Service in all its various phases, depicting both pictorially and graphically, largely through the medium of photography, how Home Service is indispensable to the modern woman. All branches of the Association's activities had their own separate Stands, where members could meet the various Section Officers to discuss individual problems.

One of the most popular showroom window displays at the Exhibition was that linking up with Home Service. Very little attention has been given to the question of publicizing this Service through the medium of display, but with its rapid development, and with more undertakings realizing its value as a sales promoting media, Home Service is now finding its place in the field of propaganda; and as its theme readily adapts itself to display, one can look forward to its future permanent inclusion in showroom window and interior display schemes.

Publicizing Home Service.

We illustrate on this page a display which has been designed specifically to publicize Home Service, and which features four of the major points of Home Service. Novelty is introduced in the form of attractive "thumb nail" sketches and photographs, and the ingenious use of Hessian cloth. It will be seen that this unit is constructed in three panels, making it adaptable to almost any size of window.

Another example of publicizing a theme of propaganda through the medium of window display is an attractive unit bringing to the notice of the public the showing of gas films. The Studio offer this display on hire terms to undertakings for use in their windows before and during an exhibition of gas films. Useful and novel forms of display were shown on the Studio's own stand, some of which comprised new designs in "Transposters," a model of a Carnival Wagon built on to a trailer, and the latest design in 16-sheet poster hoardings, which can be supplied ready for erection.

Showroom Furniture.

The Studio has on numerous occasions been requested to provide members with particulars of modern showroom, office, and demonstration room furniture; so it has been decided to stock a comprehensive range of tubular interior equipment, examples of which were on show at the Conference.

Outstanding designs in modern tables, for the showing of literature, floral decorations, or small gadgets, and comfortable chairs, ideal for showroom use, together with desks of the most up-to-date and efficient appearance, were on view. For demonstration rooms, there are chairs of modern design which fold flat when not in use, and an attractive tubular streamlined trolley which will enable the demonstrator to display the results of her work to her audience while they are comfortably seated in their chairs.

A unique unit, also of the tubular type, for the display of water heaters was also shown. This is suitable for use either inside the showroom or in the window, and is the ideal setting for the modern water heater.

This entire Exhibition was carried out by the B.C.G.A. Studio, under the supervision of Mr. William R. Oliver, Display Officer, and in a novel, entertaining, yet forceful manner presented the Association's activities to its members.

The Story of the Conference

Right away from the word "Go," it was a certainty that the twenty-seventh Annual Conference of the British Commercial Gas Association, at Brighton, would prove an outstanding event. Brighton possesses a number of attributes making for the success of such a gathering. For fear that we might be suspected of bias, we will not place first among these attributes the co-operation of a perfectly organized and markedly enterprising Gas Company, but, at any rate, the help of this Company must rank high among the advantages enjoyed by the conference.

Brighton, of course, understands well how to foster the conference spirit, and how to welcome large gatherings of delegates, and in its Royal Pavilion it possesses a world-famous *rendezvous*. And when to all this is added the geniality and enthusiasm in the cause of gas of Mr. A. M. Paddon, M.Inst.C.E., the Chairman of the Brighton, Hove, and Worthing Gas Company, and this year's President of the Association—well, we feel that we have said all that need be said on this point, though by no means all that could be said. For example, the organization of the business sessions, and of the various social functions, might be enlarged upon; but, after all, this was just of the efficient character that past experience has taught us to expect in connexion with B.C.G.A. conferences.

"Records?"

Probably, when figures come to be checked up, it will be found that this year's meeting has been one of "records" right through; and, in spite of all the advantages to which we have referred, this is a remarkable achievement, in view of the fact that the Conference had been postponed six months ago from its customary date, from causes which still are only too vividly impressed upon the minds of all.

The proceedings opened on Saturday afternoon, when the President and Mrs. A. M. Paddon were "At Home" to conference delegates and ladies in the Winter Garden Suite of the Hotel Metropole. Here the President and his wife, who were supported by Mr. H. D. Madden, the Executive Chairman, and Mrs. Madden, must have received some 400 guests. It was an afternoon which was greatly enjoyed by the visitors; while Mr. Paddon, for his part, was obviously delighted to be "receiving" so many of his old friends of the Gas Industry.

President and Past.

In the evening, gas—pre-eminently the fuel of to-day for the great majority of purposes—mingled delightfully with the past; for there was a full attendance of delegates and ladies at a reception by the Worships the Mayor and Mayoress of the County Borough of Brighton (Councillor John Talbot Nanson, J.P., and Mrs. D. Scott Prime), in the Royal Pavilion—the greatly admired building which was erected by King George IV. between the years 1784 and 1820, after designs by John Nash, and was used by that King and succeeding Sovereigns as a marine residence until the year 1845. Here some 600 guests were distributed between the two beautiful dance rooms. Amid these historic surroundings, and, welcomed with generous hospitality, the time quickly passed and all too soon the guests found themselves brought back again to the present.

Sunday provided a feast of another kind, announced in the programme as a visit of delegates and ladies to Glyndebourne Opera House, at the invitation of the Brighton Gas Company. The Opera House, which is directed by the Glyndebourne Society, is situated in the grounds of the beautiful estate of Mr. John Christie, on the Downs above Lewes. Mr. Christie, justly described as a "godparent of music," was present to receive the visitors, and it was manifest to all that he thoroughly entered with them into their enjoyment of the afternoon's proceedings. That is saying a great deal; for, unlike so many occasions in life, in the case of this visit anticipation, high as it ran, fell short of the realization. The concert programme that had been arranged for the afternoon was followed with rapt attention by the audience, who well filled the theatre. Small wonder is it that music lovers from all parts forgather here to listen to operas sung by artists of various nationalities—but very largely English. With so much to admire, it is almost invidious to single out any one feature, but mention must be made of Mr. Christie's rich music library, and his organ.

After tea, the thirteen big motor coaches, and the fleet of private cars, returned to Brighton, carrying away with them lasting recollections of Glyndebourne, with its unique atmosphere—and leaving behind them every good wish for the abundant success of Mr. Christie's great efforts on behalf of a noble Art. As the President said, all would have lasting memories of an outstanding afternoon, and of the magnificent work that is being carried on at this greatly favoured spot.

On Business.

Monday morning found the Conference ready to start business in the Dome, which was originally the Royal Stables attached to the Pavilion. Extensive reconstruction of the interior by the Brighton Corporation a few years ago has made it an admirably constructed hall for occasions such as this. The President, who had at his side Mr. Madden, as Executive Chairman, was supported on the platform by a number of the leaders of the Industry; and they were joined by the Worshipful the Mayor of Brighton, the Deputy-Mayor (Alderman Herbert Hone), and four former Mayors—all in their scarlet robes of office.

The Mayor was welcomed by the President, but it was unnecessary to introduce him, because, as already stated, on the Saturday evening, accompanied by the Mayoress (Mrs. D. Scott Prime), he had received and entertained the delegates and their ladies at the Royal Pavilion.

In extending an official welcome on behalf of the County Borough, the Mayor said his pleasure was turned into delight to welcome the Association to Brighton again, for it had held a conference there some years ago, and also on a still earlier occasion. Brighton, he said, was one of the most important conference centres, and therefore its development did not stand still, and a great many improvements had been made since the Association's last Brighton conference.

Appreciation of the interest which the Mayor and his civic colleagues had shown in the Conference was expressed by the President, who proposed a very cordial vote of thanks, which was heartily accorded.

Greetings from Poland.

A message was received from the Polish Gas Association, of Warsaw, conveying best wishes for a successful annual conference and the prosperous further development of the organization.

The President commented on the significance of the message, in view of this country's association with Poland. The Conference, he said, was proud and pleased to receive the message, and also a little amazed that, having regard to their present preoccupations, Polish colleagues should find time to send such a message. [Applause.]

Presidential Address.

At the conclusion of his Address, a hearty vote of thanks to the President was proposed by the Immediate Past-President, Councillor W. P. Jackson, of Manchester, who assured Mr. Paddon that the delegates were delighted to be in Brighton, and to have the privilege of listening to the Address, which contained so much useful data, which they would read again with great profit. The important problem of the prohibition of the use of raw coal was being considered in Manchester; but he was afraid that such prohibition in any area could only be effected by legislation. He hoped that in the very near future it would be possible to devise means of eliminating the smoke menace, which had distressed everyone for so many years. Its elimination would make this a better, a healthier, and a happier nation.

The vote was seconded by Mr. Madden, who said it was a very happy idea to hold the conference in Brighton, which was an ideal centre for such a purpose. Mr. Madden recalled his early association with Mr. Paddon and his father in his younger days at Beckton. It was a great pleasure, he said, to express thanks to one whose name was so closely associated with the history of the development of the Gas Industry.

(The vote of thanks was accorded with acclamation, and the President briefly responded.)

Sir Harold Hartley's Address

Sir Harold Hartley then presented his Paper on "The Conservation of the Nation's Resources," which led to a long and valuable discussion.

Official Luncheon.

There followed an Official Luncheon in the Corn Exchange adjoining the Dome—at which the toast of "The Ladies" was submitted by the President, and responded to by Miss Ethel Willans, Principal, Home Service Section, Gas Light and Coke Company, who expressed the indebtedness of the ladies for all that had been, and was to be, done for them in connexion with the Conference.

Subsequently the ladies, on the invitation of the Gas Company, left to take some "Glimpses of Sussex," with tea at the Manor Hotel, Horam, while the business session was resumed by consideration of a Paper by Mr. R. J. Rogers, on "Some Further Aspects of the Retention and Development of the Domestic Load."

This was followed by tea and a private discussion on the Association's activities.

Discussion on Sir Harold Hartley's Paper

Mr. R. ROBERTSON, President of the Institution of Gas Engineers, who opened the discussion, said that, after listening to this most interesting and informative address, he thought they would agree that seldom had a request been so fully and effectively complied with.

Much had been said recently of the need for a national fuel policy, and all fuel technologists and economists who had the nation's interests at heart could agree that this was long overdue. There had been too much messing about with the fuel problem in the past, and what had been done savoured more of political expediency than planning. And yet much could be done based upon information already available. The author had referred to the coal survey. This should make it possible to allocate coals to the purposes for which they were best suited. There should certainly also be some discrimination in the permissible use of fuel for purposes and in ways which were uneconomical. A check would thus be put upon the undesirable tendency to subsidize the less efficient processes at the expense of the more efficient. It could be claimed for the Gas Industry that, in ministering to the needs of the community for the heating of homes and the cooking of food, its products could make 3 tons do the work of 4 tons of coal burned in an open fire; and the service had the added merit that it involved less labour and cost less in other directions, and had less detrimental effects upon the atmosphere. Any interference with the rights of the Englishman to burn what he liked, and how he liked, was, of course, resented by some, and the Gas Industry had to a certain extent lent its aid in the vindication of the right to choose what fuel should be used. But when, in the exercise of this right, other people were inconvenienced, there was a case for interference which might very well fit into the national fuel policy of the future. The Association had been told by Mr. H. Morrison that the material damage alone done in London amounted to £1 per annum per head of the population—the equivalent of a 1s. 4d. rate. If the authorities adopted one suggestion, to grant a rebate to this extent for all householders using only smokeless fuels, it would be a fair example of the "punishment fitting the crime," and it would go a great way towards remedying the evil.

Mr. RALPH HALKETT (Sheffield) said that the Paper so ably presented to them by Sir Harold Hartley was an excellent exposition of one of the most fascinating subjects man's mind could conceive. The introduction of the Paper showed in concise form something of the possible resources of the nations and of the world, and the influence of the development of scientific knowledge, mechanical transport, and engineering ability.

Quite rightly, emphasis had been given to the increasing co-operation between the engineer and the chemist, particularly with reference to the winning of coal and its rational use in the production of finer types and grades of fuel. Fascinating as was the attempt to forecast conditions in the future of all forms of national wealth, they could only, with any degree of certainty and knowledge, state clearly the contribution which had already been made, and was still being made, to the rational and economic use of known fuel resources. It was with particular interest that they had heard, in but a few minutes, such an account of the inspiring contribution made by the Gas Industry to the conservation of the fuel wealth of the country. Had time and opportunity permitted, he would have endeavoured to add to Sir Harold's account of the contribution to national wealth which had been made, with special reference to the well being and happiness of the population, but instead he would confine himself to that part of the Paper of which he claimed to have unique knowledge.

Passing reference had been made to the use of gas for industrial heating, and he would have welcomed, personally, a review of this rapidly developing field of heat application, embodying an opinion of the future developments likely to be anticipated and possibly catered for. As they were aware, in Sheffield they enjoyed the privilege of supplying more gaseous fuel for industrial heating than any other city in the British Isles. They had shown that by close and intense co-operation between the mining and coke-oven industries on the one hand, and the users of fuel on the other, very real progress, in the truest sense, could be made.

South Yorkshire Gas Grid.

The inauguration of the South Yorkshire Gas Grid by his Company in 1931 and its subsequent development was playing an important part in the conservation of this country's coal supplies, not only in utilizing surplus coke oven gas which had hitherto been bled to waste or used uneconomically on the site, but also in providing cheap gas for industry, and in consequence substituting highly efficient types of gas furnaces with the subsequent reduction of the wasteful utilization of raw coal. Not only had this been of immense value to the colliery owners through their coke ovens and to the industrial users through increased efficiency and less wastage of their own product, but it has made immense progress in improving the atmospheric conditions in the district. In fact, if the supplies of coke oven gas were sufficient to meet the potential demands, Sheffield would be able to compete with Brighton as a health resort.

He noted the remarks regarding the use of steel welded mains. It might be of interest for him to state that in conjunction with the tube makers they developed a form of joint which had been of great value to them and to the Gas Industry generally. This joint, known as the "spherical joint," gave such flexibility in laying that the need for specials was almost entirely eliminated. They were one of the first, if not the first, to weld their joints by the electric arc method, and the special sheathing which was developed for them by the tube makers had removed any fear of external corrosion, from either bad soil or electrolysis.

He had to confess that he had never felt quite comfortable with the hessian wrapped tubes, although in several cases he had found them quite good after twelve years, but in some cases otherwise. He was, however, quite satisfied that there need be no anxiety with the sheathed tubes, so much so that they had laid over 47 miles of this type, varying in diameter from 24 in. down to 6 in.

The figures relating to development of the utilization of surplus coke over gas were interesting, and to show the important part the Sheffield and District Gas Company had played in this development he would give their corresponding figures for each of the years named:

Year.	Total as Quoted, Millions.	Sheffield Figure, Millions.
1926*	2,322	689
1931	10,948	4,894
1934	18,194	6,198
1935	20,474	7,099
1936	24,531	8,361
1937	27,486	10,058

* Year of the great coal strike.

Sir Harold's remarks on the development of coke sales were very important, and he did hope that the gas and coking industries throughout the kingdom would get together immediately and set machinery further in motion to increase the sale of coke, for which he strongly believed there was a large potential demand.

It was the ambition and constant aim of the Gas Industry to emphasize the importance of the coal utilization problem, as they realised that if coal was treated scientifically one of the curses of modern times—namely, atmosphere pollution by smoke, was removed.

While every endeavour was being made to train the public as to the wasteful use of raw coal, he often wondered if they made much progress in this direction. Despite honest endeavour on the part of the public utility companies, he noticed Sir Harold stated that for the year 1937, compared with 1920, more raw coal was used for domestic and general purposes, representing an overall increase of more than 5 million tons per annum.

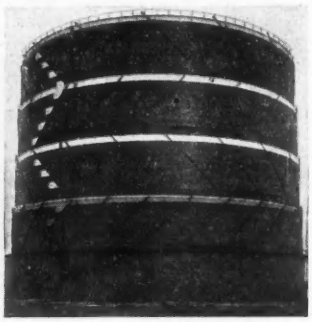
In Sheffield, where 90% of the working population was engaged either directly or indirectly in the steel, cutlery, or allied trades, and having an industrial load of over 70% of the annual consumption, it had been their ambition to encourage not only the increase of gas in the homes of the people, but also in the works and factories.

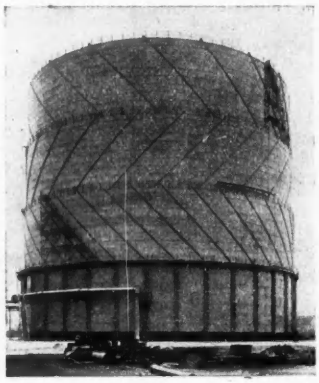
He was not exaggerating when he mentioned that there were no works of any importance in their area of supply where gas did not play its part in the production of the goods, while the working conditions now available to the workpeople were definitely appreciated.

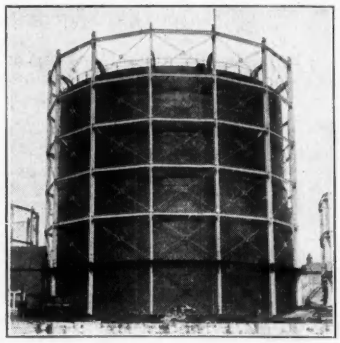
Mr. W. W. TOWNSEND (Colchester) said that the first thing that had occurred to him, on reading the title of the Paper, was that the last people in the country who seemed to take any account of the matter of the conservation of the nation's resources were those who represented the nation in Parliament. One would have thought that in a matter of such overwhelming importance the Government would long ago have discovered the necessity of doing something about it, and might even have appointed a Minister of Conservation. That would be very novel, of course, because most Ministers were chosen for their ability to spend rather than their ability to save. But it might have some very important consequences. The generation of electricity had been taken under the wing of the Government. Electricity Commissioners were appointed; and all honour to them, because they did their work extremely well and followed the policy of furthering the use of electricity for every possible and impossible purpose, quite regardless of the conservation of fuel. Gas, a very much older Industry, occupied one very small corner of the Board of Trade, where

GASHOLDERS

GUIDE FRAMED
SPIRAL - WATERLESS







PURIFIERS
CONDENSERS
STEEL BUILDINGS
STEEL TANKS

COAL AND COKE HANDLING PLANT
SCRUBBERS
WASHERS

SAML. CUTLER & SONS, LTD.

LONDON
39 VICTORIA STREET, WESTMINSTER
Telephones : ABBEY 3121 Telegrams : RETORTUS, SOWEST, LONDON
PROVIDENCE IRONWORKS, MILLWALL
Telephones : EAST 5231 and 5232 Telegrams : CUTLER, MILLWALL, LONDON

468

SAWER & PURVES

(BRANCH OF METERS LTD.)
Sole Makers of **"THE MODEL COIN COLLECTOR"**

Ask for Particulars

It will be a pleasure to supply them

Painted and lettered as required

Excellent Finish

TELEPHONE
Manchester 2289 Collyhurst
Nottingham 75202
Watford 2645

TELEGRAMS
Sawer, Manchester
Sawer—
75202, Nottingham
2645, Watford

Derby Road
Watford

ESTABLISHED 1869.
NELSON METER WORKS, MILES PLATTING, MANCHESTER, 10

Radford Meter Works
Radford Road
Nottingham

it was mixed up with things such as life saving in the Mercantile Marine.

Nowadays, when a municipality was considering a new project, such as a swimming pool, a library, or a school, there was a battle royal between electricity and gas with regard to the heating. The plans were submitted to a Government Department for approval. Somebody should say, "A plague on both your houses." In the national interest, the work should be done in a certain manner. In the first place, raw coal should not be used at all, and, secondly, experts should say whether in the national interest it should be done by coke or by gas, or in certain very rare cases by electricity. Yet, very often municipalities which happened to own and run electricity undertakings considered it to be their duty to advocate electricity even for heating a swimming pool, which was a ridiculous thing to do by electricity.

Commenting on Mr. Robertson's reference to a national fuel policy, he suggested it was high time that some sort of Commission was established to deal with the matter from the national point of view. He recalled the report prepared, about the year 1920, by Cobb, Smithells, and Clerk, which compared the relative efficiencies of electricity and gas in using the heat from coal, and showed very conclusively that in the national interests the Gas Industry was making far better use of the heat units in coal. But, even so, the report had not taken into account the advantages of the by-products in gas manufacture. One could not evaluate a substance such as benzole simply on its heat content. It would be valuable, therefore, to bring that report up-to-date, because both industries had progressed considerably since it was written.

The Value of Tar.

Mr. HAROLD C. SMITH, Tottenham (Past President, The Institution of Gas Engineers), commenting on Sir Harold Hartley's reference to the value of tar and benzole in the plastics and dye industries, and the suggestion that even if it were not necessary to carbonize coal to make gas, it would be necessary to carbonize it in order to produce those by-products, said he had been imagining the price of tar going up and up. But remembering, as a tar distiller, the price that had been obtained for it recently, he said that unfortunately other people had not the same idea as the Gas Industry with regard to the value of tar. However, it was very comforting to hear that it was an absolute necessity. It was not stated in the Paper that, despite the very limited success that had attended the hydrogenation of coal, the hydrogenation of creosote was a proved success, and during the last year or so had been the saviour of the tar industry.

Although Sir Harold had stated that the contribution which the Gas Industry had made to coal conservation had depended very largely on the rapid technical progress of the last 20 years, he had not mentioned research; and one hoped that before long some proposals would be put before the Industry which would help to make it more research-minded and would contribute to the solution of the problems which had still to be solved.

A Statement of Fact.

Mr. FRAS. C. BRIGGS (Dudley), who referred to the Paper as a masterly summary by an eminent scientist, said that if it had been written by a gas engineer it would have been called extreme propaganda; but by a scientist of such eminence and veracity it must be accepted as a statement of fact. It was extremely cheering that such a statement had been made by someone with interests outside the Industry.

With regard to the summary in the Paper of the valuable research of the Coal Survey and the efforts to find the right type of coal for various purposes, he said Sir Harold would have increased the value of the Paper if he had indicated how, under the operations of the Coal Mines Act, gas engineers could obtain the coal they wanted where they wanted it.

It should be emphasized that, as mentioned in the Paper, the enormous saving of labour on the works had been more than counterbalanced by the employment of skilled men on the district. The Gas Industry to-day employed far more men than it employed in pre-war days. There had been a change from beef and brawn to brains, and in the interim period the Industry had not thrown labour on the market. It was a very big employer of labour of the best skilled type.

Although there might be big increases of consumption of industrial gas in places where there were large munition factories, he believed that generally speaking the uncertainty of the international situation was rather calling a halt to the extension of the industrial use of gas, and one looked forward to a period of greater certainty so that progress could be continued.

By the operations of the Coke Associations, much closer working between the gas and the Coke Oven Industries was coming about, and he hoped it would go very much further.

With regard to the importance of the by-products of the Gas Industry, from time to time people had referred to electrical progress and had asked how long the Gas Industry would last. His reply was that if the Gas Industry appeared to be going under by reason of electrical competition, the Government would begin to back the Gas Industry, because in no circumstances could it afford to allow that Industry to go out of existence. It was pleasing that Sir Harold had made the point so strongly, and had given so much encouragement by pointing to the very great future of the Industry.

A Vital Position.

Mr. R. W. FOOT (General Manager, Gas Light and Coke Company) pointed out that the Paper was of an entirely different kind from the ordinary technical paper, and he urged that the fullest possible use should be made of the valuable material it contained, if Sir Harold would give the Association the copyright. Sir Harold had shown the reasons why the Gas Industry occupied an essential, and vital, position in the country's economics and welfare. There were few enough people outside the Industry who knew that to be true; and in Parliamentary Committee proceedings it was always necessary, as a preliminary to getting the Industry's case heard, to convince the members of the Committees of that truth.

One knew the difficulties in the last generation of impressing upon those in authority in this country that the Gas Industry was vital and essential. If one compared the Gas Industry and its treatment with the other great public utilities, one was inclined to think that it suffered as a sort of poor relation, a sort of Cinderella of public utilities. The vital position occupied by electricity was apt to be over-claimed rather than over-stated. It was true that electricity was essential and vital to the country. But in regard to the Gas Industry there was still far too little understanding; and that was why he ventured to ask what was to be done with Sir Harold's Paper. It was far too good and far too important to be filed away in the archives of Gas Industry House. The Railway Companies had put themselves very much in the public eye. The Gas Industry also wanted its position as a vital and essential Industry understood and appreciated in the country. The Paper provided food for thought; but he believed also that it provided material for action, and he urged that the contents of the Paper should be brought home to the people whom it was important should have that sort of knowledge. It had the very greatest commercial value and a very great prestige value, both of which were equally important. The public generally should learn what the Gas Industry had done in the past and was doing at present, and would do in the future.

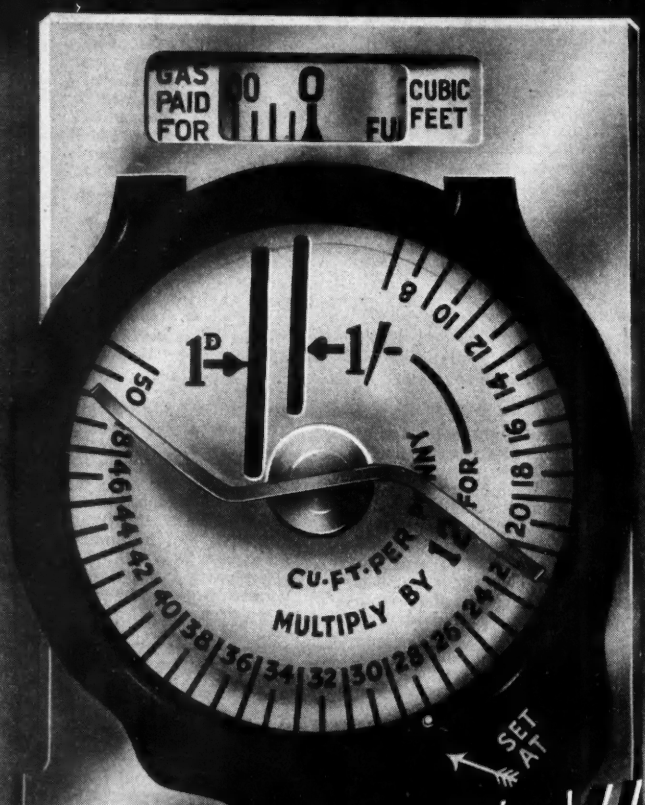
Emphasizing Sir Harold's remarks on the importance of co-operative working between the Coke Oven and the Gas Industries, to which he attached the very greatest commercial importance, there was no question at all that the net return on coke was having an increasing importance in influencing the price of gas. The prosperity of the Industry was dependent, one might also say, to an alarming extent, upon maintaining a good return for coke, and in order to guarantee that good return, three essential factors must be fulfilled. The first was to produce a good coke—and that was certainly not done all through the Industry to-day. The second was to ensure proper technical development in connexion with coke sales, and the right sort of apparatus. Thirdly, there must be the right sort of commercial arrangements for maintaining a fair and proper price. The first two were in the hands of the Gas Industry; the third could not possibly be achieved unless closer arrangements were made—and the closer the better—on a real co-partnership basis with the sister Coke Oven Industry. That was pretty well the most important practical thing the Gas Industry had in front of it to-day.

Sir Harold Replies.

Sir HAROLD HARTLEY, in his reply, said he had tried to make the Paper as objective as possible, and he had never been more delighted with the general plane of the discussion of a Paper which he had presented, and he hoped it would have an effect over a wide field. They had reached a point, which was evident in many industries and in many countries, at which there was a general acceptance of the view that uncontrolled individualism did not always yield such satisfactory results as in the days of that great expansion in the nineteenth century when the great continents, with all their resources, were being opened up for the first time and there were great increases of population. To-day the need for a certain measure of planning had been recognized, even in this country, which perhaps was more attached to individualist methods than any other country. The problem of a national fuel policy was very urgent at the moment. In any planning one was faced with the problem of how to provide that dominant control which planning, unfortunately, must involve, and at the same time the preservation of individual initiative. But the difficulty of that compromise was no reason for not facing up to the problem.

He did not think it was generally realized that, although the Gas Industry was more than a century and a quarter old, it had shown at every period of its history an extraordinary power of adaptation to the needs of the country; and since its renaissance twenty years ago, since its logical basis was recognized by the introduction of the therm, it had shown that it was as modern in its methods as any other industry. He agreed with Mr. Foot that that was a fact which should be put to the public.

SMITH METERS



THERE ARE OVER ONE MILLION
DU-SLOT ATTACHMENTS ALREADY
GIVING ENTIRE SATISFACTION

SMITH METERS LTD.
Established 1834

186, KENNINGTON PARK ROAD; LONDON, S.E. 11.
Telephone: RELiance 2447/8/9
LEEDS OFFICE: 3/4, EAST PARADE, LEEDS, 1.
Telephone: LEEDS 23726

Gas-Fired Heating Plants and Installations in Bradford

by R. H. ANDERSON
(Bradford).

From a Paper to the Yorkshire Junior Gas Association, March 18.

Gas-fired central heating is an important subject. The load is one we cannot afford to miss, and the choice of staff to deal with it is of paramount importance.

It is essential that the staff has an adequate knowledge of the basic principles of heat and its application. It is not sufficient to hand out leaflets to prospective clients; each case must be carefully considered with a view to recommending the boiler and heating system most suitable for the particular purpose. Estimates of installation and operating costs must be carefully prepared in order to avoid complaints and dissatisfied consumers.

Installation of Plant.

In the case of a client requiring a complete installation we are prepared to quote for a system of heating including a survey of his premises if he has not a plan available. We point out that we do not install the plant ourselves, but sublet the work to local heating engineers, and enquire if he has a preference for a particular contractor.

Here the question of having a definite scheme prepared to submit to the heating engineer is of importance, as it is possible that independent estimates may be received for totally different types of systems and heating surfaces, and when giving running costs for a season's heating it would be a difficult proposition when the schemes vary. The sub-letting of installation work to engineers encourages them to push gas-firing and helps to establish and maintain goodwill between them and the Department.

[The Author then described the various types of circuit used in central heating.]

The Boiler House.

This being the heart of the installation, it requires a careful study, and I would suggest that you make sure of the following points:

(1) The boiler house should have adequate free air entry to give sufficient air for complete combustion and also for the dilution of the products of combustion entering the flue. (Gas to air—1 to 15.)

(2) The flue should be as straight as possible and preferably on an internal wall. In the base of this flue there should be a free air entry made equivalent to flue area. If the flue is not all that can be desired, I would suggest that you make use of an independent asbestos cement flue carried outside the building. In this case, where the flue passes through the wall, a tee piece must be fitted, the lower open end of the tee should have a lead cap fixed by means of a W.I. clamp with a drain hole made in it, or if desired a lead pipe connected to it and carried to a suitable spot for discharge of condensate. (No condensation difficulties have been experienced in flues of boilers over 200,000 B.Th.U. per hour output.)

(3) Make sure that the boiler house is of sufficient size to accommodate the plant, also leave sufficient room on all sides or above the boiler to facilitate cleaning and examination.

(4) The boiler house should be as dry as possible, for if it is wet sweating may take place in the boiler during such times as it is not in use. Also any visit to clean the boiler at end of heating season will have to be duplicated again before lighting up the plant for the next season's run. I would suggest that the boiler at least should be emptied of water when standing, and, if possible, the flueways should be left opened to allow free air entry to them during such times.

(5) Make your boiler house layout as neat as possible in appearance.

(6) It is preferable that the boiler be raised on a brick plinth.

(7) When designing a plant for day working only, the heating surface installed should be above the normal requirements so that the daily heating-up period is not unduly prolonged even in severe weather.

(8) The boiler should always have at least 30% margin over and above radiation surface.

(9) With gas boilers you cannot increase the boiler size by adding a further section or two as you can in the coke-fired pattern

Natural Draught Boilers.

These may be divided into two main types—the C.I. sectional and the steel firetube type. For small plants or where appearance and simplicity are important the C.I. sectional type with enamelled jacket has much to recommend it. Further, the use of a common combustion chamber makes for low pilot consumption and ease of inspection.

It has been found, however, that in a large number of instances a more robust type of appliance is required. Vitreous enamel does not have a long life even in well-favoured circumstances, and certain types of sectional boilers are impossible to clean thoroughly. As a result we have a preference for a converted boiler if the position is unfavourable or the duty severe.

For high-pressure steam or water heating the steel firetube boiler is to be recommended, but has certain limitations. Where access is difficult installation may become expensive, and with a vertical boiler headroom is necessary to facilitate cleaning. With the horizontal type more floor space is required and chimney draught to a varying degree is necessary. The absence of baffles or retarders in the firetubes is a useful advantage, reducing replacement costs and also cleaning. It is impossible to check combustion, even approximately, without the use of the Orsat apparatus, and serious inefficiency may result if the balance is not correctly maintained.

With separate jets in each firetube the pilot consumption is necessarily large.

Fully automatic steam boilers require a high degree of service experience, but can give exceptionally good service. We have had the experience of both the electric and steam relay controls for boiler feed pump operation, and of the two the latter is perhaps the more satisfactory, but may have the higher power consumption, and in either case the use of a low water gas cut-off is essential. This latter, however, should be fitted with a blow down cock, and should be tested daily. Systematic attention is important for the whole installation but it is vital where reliance is placed on the automatic gas cut-off.

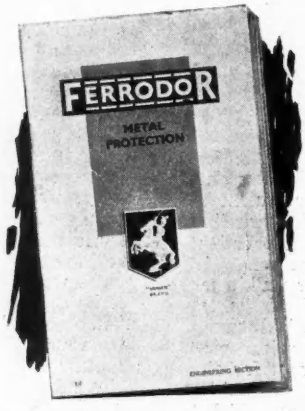
Boiler Conversion.

The conversion to gas of solid or oil fired boilers can be carried out by various methods. There are many suitable burner units on the market, but in Bradford we have made all our own sets with one exception.

A boiler for solid or liquid fuel firing has much larger flueways than a boiler designed specially for gaseous firing, and in the combustion chamber, therefore, it is essential in converting one of these boilers to design the baffles to give the greatest possible length of travel to the products of com-

THE MAINTENANCE OF GAS HOLDERS AND OTHER STEEL STRUCTURES MINIMISED WHEN THEY ARE PROTECTED WITH

FERRODOR
METAL PROTECTION



Write for illustrated Booklet 1/J.

GRIFFITHS BROS. & CO. LONDON LTD.

Paint, Enamel and Varnish Specialists

MACKS ROAD, BERMONDSEY
LONDON, S.E. 16

Telephone - - - - - - - - - BERmondsey 1151

bustion, at the same time ensuring maximum contact with the heating surface of the boiler.

[The Author gave details of boiler conversions and also dealt with control system.]

Gas Fired Air Heating Plant.

We were asked to heat a large garage and to incorporate ventilation for the removal of exhaust fumes from the internal combustion engine exhausts. After careful consideration it was decided that the best method of tackling the job was to use a fairly simple form of direct heating. It was not necessary in this instance to use any air washers or filters, neither did the question of humidity arise. The heater selected was of the direct gas-fired "Volex" air heater having four fan blast burners. The controls were mounted on a neat panel and consisted of inlet and outlet air temperature dial thermometers, variostat temperature control, Allen-West automatic starter for fan blast to burners, and necessary switch and fuse gear. The air was circulated to the garage by means of a large electrically-driven double inlet centrifugal fan. The garage layout and the parking arrangement of vehicles did not lend itself to the use of a system using high velocity overhead discharge. We therefore designed a system of low velocity low level discharge. On working out the heat requirements we found that the following heat inputs were required.

	B.Th.U. per Hour.
Main garage	2,180,000
Small garage	640,000
Various stores, &c.	60,000
Total requirements	2,880,000

We found by calculation that with an air discharge of 140° F. we should be able to give 1½ air changes in the main garage and various stores, &c., per hour, and maintain the required temperature, but owing to the small garage being built only of steel and asbestos we found that it was necessary to increase this figure to slightly over two changes per hour and that we had the following requirements on which to base our calculations of the plant:

2,880,000 B.Th.U. per hour.
1,800,000 cu.ft. of air at 140° F. per hour.

Assuming our outside air temperature at 30° F. it was necessary to raise the output air 110° F. to give the required temperature.

The ducting was designed to allow the following air velocities:

Main fan outlet	2,000 ft. per minute
Main distribution	1,500 „ „ „
Branch ducts	1,000 „ „ „
Discharge points	600 „ „ „

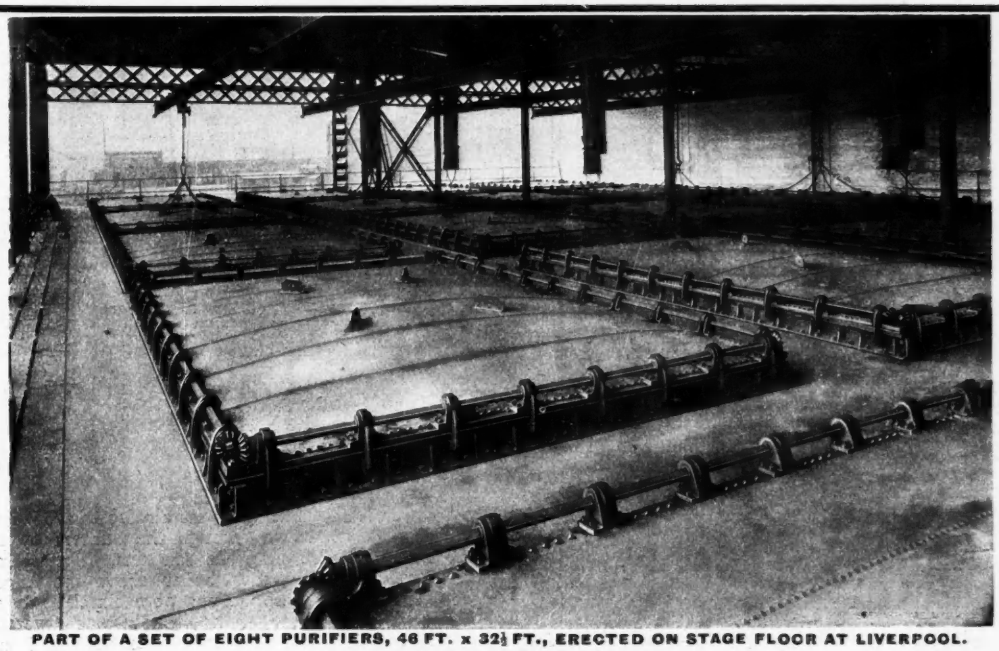
All ducts were carried overhead in garages and drops taken down to within 3 ft. of floor level, the duct sizes vary from 48 in. diameter to 6 in. diameter, and in the main garage the drops were 12 in. square, in the small garage 7 in. square, and the stores, &c., being 6 in. square.

Heater Design.

The heater was designed to raise the temperature of 30,000 cu.ft. of air per minute to 140° F. above the inlet temperature. Four "Gako" fan blast burners were used having a maximum rate of 9,000 cu.ft per hour. The air to burners is supplied by a small fan direct coupled to a ¼ B.H.P. motor. The main fan is driven by a vee belt drive from a 30 B.H.P. motor. The fan is capable of delivering 30,000 cu.ft. per minute against a resistance head of 2¼ in. W.G.

The gas was controlled by a 6 in. motor-driven gas valve having a programme switch incorporated to operate by means of Allen West starter the air supply to burners.

When heat is called for the gas valve takes 30 seconds to open fully and after this operation has been commenced for one second the programme switch is closed and starts up the fan for burner air. When the variostat requires to shut off



PART OF A SET OF EIGHT PURIFIERS, 46 FT. x 32½ FT., ERECTED ON STAGE FLOOR AT LIVERPOOL.

COMPLETE PURIFIER INSTALLATIONS
WITH BOXES IN C.I. OR STEEL

C. & W. WALKER, LTD., DONNINGTON, Near WELLINGTON—SHROPSHIRE.

'Phone: Lilleshall-Shropshire Nos. 34 & 35 (2 lines) 'Grams: "Fortress," Donnington, Shropshire
'Phone: Victoria No. 1941 LONDON OFFICE: 70, VICTORIA STREET, WESTMINSTER, S.W.1. 'Grams: "Fortress," Sowest, London

heat the closing cycle of gas valve runs for a period and then shuts off the air fan, as it becomes fully closed. The inlet air temperature is taken outside the heater house and the outdoor bulb of the variostat is fixed alongside this. The final air temperature and variostat controlling bulb are placed in the duct on the outlet side of the main fan. This plant is put into operation at the beginning of October and closed down at the beginning of May each year. The heater house is not convenient for periodic inspection, and it was therefore necessary to install some system of alarm. We designed an alarm system which would give warning of any faults, as follows: Failure of main fan; gas failure; burner gas and burner air not synchronizing.

We used a combined system of bell and siren, operated by a large storage accumulator. The alarm unit was made in our works and consists of four small bell governors with the usual balance arm and counter-balance weights. Mercury tubes are mounted on the balance arms so that any lowering of the bell would make contact and give an alarm. The main gas and main fan balance arms were fitted with one tube on each, but on the burner gas and air arms there were two tubes. Thus if the float of the main gas or main fan should be lowered, contact is made likewise. If the burner gas and air bells do not rise or fall in step a connexion would be made across the back tube on one and on the front of the other, and so contact would be made and an alarm given.

On test the following figures were obtained:

Heater Efficiency (Running).

By-pass—CO_2	2	%
Flue temperature	235°	C.
Flue loss	48	%
Full load—CO_2	10·5	%
Flue temperature	304°	C.
Flue loss	23	%

Tests were carried out with the plant running for periods of sufficient time in both full load and by-pass conditions, to enable us to make a test when steady flue temperatures were reached, and the following figures were obtained:

By-pass—CO_2	2	%
Flue temperature	200°	C.
Flue loss	41	%
Full load—CO_2	10·5	%
Flue temperature	375°	C.
Flue loss	26	%

A third test was made under normal working conditions over a period and readings were taken of the gas rate, quantity of air passed, maximum and minimum temperatures of air, both at inlet to the heater house and on the outlet side of the fan. When the necessary correction had been applied the efficiency was found to be 68%.

Gas Fired Steam Heating Plant.

Here steam is used for heating purposes in four ways: (1) Air conditioning plant. (2) Steam unit heaters. (3) Steam pipe coils. (4) Calorifier and water radiators.

The duty of the plant is as follows (maximum).

1.	Hourly output	11,700,000 B.Th.U.
2.	Maximum hourly gas rate	28,000 cu.ft.
3.	Working pressure of boilers	7 lbs. per sq.in.
4.	Working hours of plant (52 weeks' season)	168 hours per week
	Number of boilers working vary according to the steam load.	
5.	The steam system was designed on the low pressure vacuum return system.	

The boilers used are nine No. 3 GB. 130 "Ideal" gas-fired steam boilers, each capable of an output of 1,300,000 B.Th.U. per hour, the control fitted being the Drayton Simplex steam pressure thermostat. These boilers are arranged in one long boiler house and have a very neat appearance. They are connected to four vertical flues and are arranged in three batteries of two and one battery of three. They discharge their products into asbestos collecting boxes over each battery, and these then connect to vertical flues. The gas is metered by a No. 75 "BM" meter and carried to the boilers in a 10 in. diameter steel main from which are taken two 2 in. supplies to each boiler, and also a separate supply to the safety pilots. The steam leaves the boilers and is carried to the plant by a 10 in. main, and the condense is returned to the boilers by a "Dunham" vacuum pump set which delivers into a 6 in. condense main connected to the boilers. The pump set maintains a vacuum on the incoming condense lines of 26 in. The make-up water when required is fed in by means of an automatic boiler feeder. An electric low level alarm is fitted to the battery to give audible warning of low level.

As originally proposed the number of burners on the installation was approximately 8,100, but finally Bray 254/50 were fitted and these gave better results with a longer working life and the number of burners was then reduced to approximately 5,800.

It was very interesting to note that these boilers on examination were found to keep very much cleaner in the flueways than the water pattern. This is probably due to the effect of a higher temperature in the water space than that of same in normal hot water boilers.

Large Conversion from Oil to Gas.

The conversion of this battery of oil-fired boilers is worthy of mention owing to their size and pattern.

The heating boilers consisted of three "Beaness" K.U.11, have an output of 1,663,400 B.Th.U. per hour each, and the small domestic boiler was a "Beaness" OK.3, and had an hourly rating of 420,000 B.Th.U.

The boilers are of welded steel construction, each section having a number of oval cross-tubes and the last two sections consist of economizers with a wet back wall between these and the previous sections. The flue offtake is at the bottom of the back section and connects to horizontal brick flue. The boiler sections are coupled together by means of mild steel flow and return headers. The horizontal brick flue joins a vertical flue which is 108 ft. high, having a cross-section area of 4 sq.ft. at the base (internal). Owing to this feature and the size of the boilers our usual type of conversion could not be used. Different methods of gaseous firing were considered and it was decided to use gas burners having fan air blast, "Gako" burners being the type selected. Owing to the products of combustion having to pass down the back of the boiler and along the horizontal flue, we had to be sure that in the event of a fan failure the main gas supply to the burners must be automatically cut-off.

This was effected by the use of a Drayton G.D.V. type gas valve, but instead of lifting the diaphragm by gas pressure we applied air delivered from the fan units. The thermostats fitted to the boilers were Drayton V.V.H. mercury tube pattern, and a Venner type B.2 time switch, and an Allen West automatic starter for the fans were supplied to each boiler.

These were mounted on a mild steel control panel fitted near the boilers. The following are the details of gas and air supplied to each burner:

Maximum gas	5,000 cu.ft. per hour
Fan blast air at 2 in. w.g.	
Gas connexion on burner	2 in.
Air connexion on burner	6 in.
By-pass gas rate	600 cu.ft. per hour
Safety pilot jets.	

It was found that sufficient air for this by-pass consumption could be drawn through the burners by the chimney alone without running the fan sets. The permanent pilot jets were fitted to each boiler above the burner and the baffles used in these boilers were simple and consisted of firebrick. The floor of the furnace was covered with 3 in. thick tiles and two side walls were built up 9 in. thick to a height of 2 ft. The wet wall was faced with firebrick 4½ in. thick, and then an arch was thrown over to the back from side to side, being 18 in. from back to front and 4½ in. in thickness. A brief description of the cycle of operation is as follows (by-pass and pilot alight).

The clock control switches on the fan set, which on attaining full pressure in the burner head opens up the G.D.V. valve and so turns on the main gas supply. On the water

reaching the required temperature the thermostat switches off the fan set which in turn shuts down the main gas, and so the cycle of operation continues.

The heating system is one of the accelerated hot water pattern, and the pump set fitted had a starter suitable for automatic control, so we therefore decided to make the plant still further automatic by arranging two thermostats in the main flows which were wired together in parallel and connected to the starter. These thermostats were set to come on at a temperature of 120° F., so that when the boilers start up and this flow temperature is reached the circulating pump automatically starts, so saving the engineer paying an early visit to the plant to do this job. At night after the boilers have closed down by the clock control the pump continues to run until the flow water temperature drops below 120° F. We obtained the following figures on test:

CO_2	11 %
Flue temperature	250° C.
Flue loss	23 %

After the boilers have been working for a week or so, the engineer reported they were showing signs of leakage, and after a thorough examination had been made no leak could be found, so we then looked for condensation. When searching for the leak the boilers had been working for some hours, and at that time we could not find any trace of moisture in the horizontal brick flue, but on examining the bottom of the economizer section traces could be found of some condensation having been present. It was then decided we should be present the following morning before the boilers were switched on, and make an examination at this point again, and furthermore to do this at frequent intervals to ascertain how much condensation was found, and over how long a period this took place. We found after the boilers had been working for a few minutes quite a considerable quantity was dropping from the economizer tubes, and that before long there was a covering of water over the bottom, and it was further noticed that this condensation ceased to drop when the return temperature had risen approximately to 90° F.

To reduce this excessive condensation the inspection door of the boiler was left open during the heating period, and a radical improvement was found to have been made, and to prevent the small remaining quantity of condensate from seeping through the sections on to the floor it was decided to tile out the base of the economizer sections, as the tiles would get hot and would evaporate off any slight deposit.

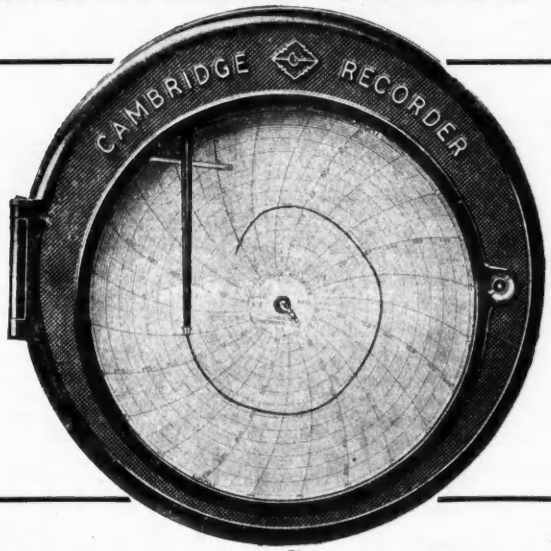
Further, to avoid the manual operation of opening up the doors each time of lighting up it was decided to equip each boiler with a Drayton R.Q. type pulling motor, which would be wired to a thermostat fitted in main return, so that at night when the return drops below 90° F. the motors would commence to run and open up the inspection doors ready for the morning's run, and when the plant had started up and the return temperature reached 90° F. the doors would be automatically closed by these motors. This latest improvement has eliminated condensation.

This was done on similar lines to our usual method by using bar burners having two rows each of Bray 254/45 burners. On the top of cross-tubes two W.I. baffle plates were placed so as to gain a little increased travel for the products of combustion. The flue connexion to this boiler was also at the base of the back section, and the boiler has only one economizer section, but we considered it would be very unwise to attempt to use the flue as it stood. This flue was therefore removed and a new one fitted at high level on this section. Also a tight baffle plate was fitted between the top of the boiler and the top of the cross-tube in the economizer so as to make use of part of this section. The standard all-gas thermostatic control system was used with an automatic "on" and "off" clock. The following figures were obtained on test:—

CO_2	5 %
Flue temperature	300° C.
Flue loss	30 %

(A report of the Discussion which followed will be given in a subsequent issue of the "JOURNAL.")

CAMBRIDGE PRESSURE RECORDERS



These are robust, accurate and reliable instruments suitable for any draught or pressure measurement in gas manufacture and distribution. The charts are 10 inches in diameter, giving clear, open records. Range from 2 inches of water across the chart, up to 2,000 lbs. per square inch.

3513

Details of these useful instruments, including a PORTABLE PRESSURE RECORDER for recording occasional tests at different points are given in

FOLDER 47·D

CAMBRIDGE INSTRUMENT COMPANY LIMITED

13 GROSVENOR PLACE LONDON S.W.1

PEGSON COKE SCREENS

Four New Plants in which PEGSON SCREENS will be installed :—

Blackpool— to the instructions of **Messrs. West's Gas Improvement Co., Ltd.,** for screening equipment to be included in the new Gas Works of the Blackpool Corporation Gas Department at Marton.

Pegson units for Scalping, Grading, and Debreezing include:—

Two 8′ x 4′ Single Deck Screens. Two 10′ x 4′ Double Deck Screens.
One 10′ x 4′ Single Deck Screen. Ten 5′ x 3′ 6″ Screens.

Wandsworth— to the instructions of the **Wandsworth and District Gas Company** through the contractors, The Woodall-Duckham Company, for Debreezing equipment to be included in the new Wandsworth Plant. Ten 5′ x 2′ 6″ Screens.

Watford— to the instructions of **Messrs. Gibbons Bros., Limited,** for the new plant at Watford Works for the Watford and St. Albans Gas Company.

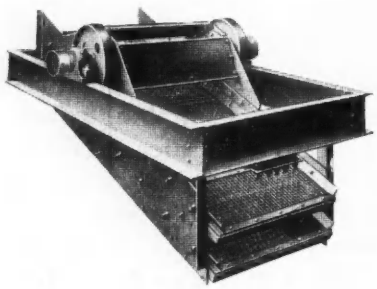
Pegson units for Scalping and Debreezing include:—

One 10′ x 4′ Single Deck Screen. Three 4′ x 2′ 6″ Screens. Two 4′ x 3′ 6″ Screens.

Brighton— to the instructions of the **Moxey Conveyor and Transporter Co., Ltd.** for the new Coke Handling Plant at the Portslade Works of the Brighton, Hove and Worthing Gas Co.

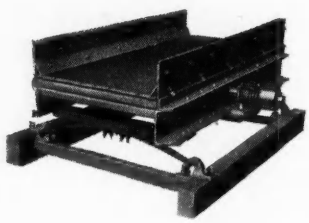
Pegson units for Scalping and Debreezing include:—

One 12′ x 4′ Double Deck Deep Frame Screen. One 4′ x 2′ 6″ Screen.



Left : The PEGSON - TELSMITH Heavy Duty Screen for Scalping and Grading.

Right : The PEGSON Open Deck Screen for Debreezing.



PEGSON

COAL AND COKE SCREENING EQUIPMENT

PEGSON LTD. COALVILLE LEICESTERSHIRE

PEGSON S.10

Markets and Manufactures

Current Sales of Gas Products

The London Market

April 24.

Prices of Tar Products in the London market remain as follows:

Pitch, nominal, at about 27s. 6d. per ton f.o.b.
Creosote, about 3½d. to 3¾d.
Refined tar, 3¾d.
Pure toluole, about 2s. 4d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, about 11s.
All per gallon naked at makers' works.

The Provinces

April 24.

Crude Gas-Works Tar, 12s. to 17s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 29s. to 30s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 29s. to 30s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4⅛d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5½d.; heavy tar oil, gr. less than 1,080, 4¼d. to 4½d.

*** All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.**

Scotland

GLASGOW, *April* 22.

There has been no improvement in trading during the week and prices are therefore unchanged. Where possible production is being kept at a minimum.

Crude gas-works tar.—The actual value is about 30s. to 32s. per ton *ex* works in bulk.

Pitch of vertical quality can be secured at 20s. to 21s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—There is a fair demand for delivery in the home market over the season at 3¾d. to 4d. per gallon. Export business is unchanged at about 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil.—A small but regular business is being conducted at the following prices: Specification oil, 3¼d. to 3¾d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—With orders very scarce production is being kept at its lowest. Values are approximately as follows: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command round 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon and 90/190 heavy naphtha is about 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is valued at 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. 6d. per gallon and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole..	0 9½	to	0 10	per gall. at works
Motor „ ..	1 3	„	1 3½	„ „ „
90% „ ..	1 4	„	1 4½	„ „ „
Pure „ ..	1 8	„	1 8½	„ „ „

Contracts Advertised To-Day

Borehole Pump, Steam Operated.
Blackpool Gas Department. [p. 290.]

Boosting Plant.
Blackpool Gas Department. [p. 290.]

Carburetted Water Gas Plant.
City of Plymouth Gas Department. [p. 289.]

Coal.
Burnley Gas Department. [p. 289.]
Chelmsford Gas Department. [p. 290.]
Sidmouth Gas Department. [p. 290.]

Ferro-Concrete Foundations.
St. Helens Gas Department. [p. 290.]

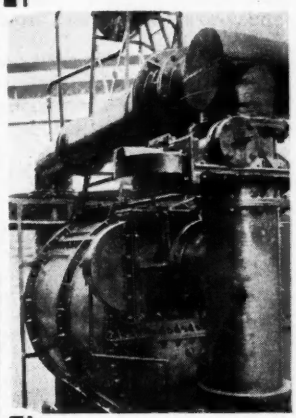
Railway Wagons, Maintenance, and Repair.
Stockport Gas Department. [p. 290.]

Stores.
Birkenhead Gas Department. [p. 290.]
Birmingham Gas Department. [p. 289.]

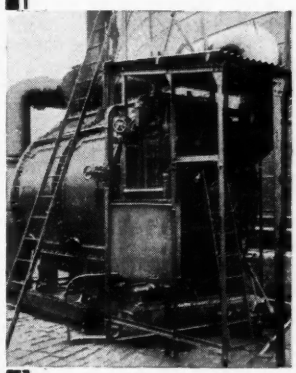
Dividend Announcement

South-Eastern Gas Corporation, Ltd.—The Directors of South-Eastern Gas Corporation, Ltd., announce that they are recommending at the forthcoming annual general meeting a final dividend on the ordinary shares of 3% actual, less tax, making with the interim dividend already paid, a dividend of 6% actual, less tax, for the year ended March 31, 1939 (same). The annual general meeting will be held on May 3, 1939.

When a Joint leaks—



Permac Joints in a Gas Works.



Permac Joints in a Gas Works.

Consider the loss in output while the plant is shut down and the joint is being re-made.

"Permac" the original Metal-to-Metal Jointing makes leak-proof joints that last till you want to break them down. Stands up to all temperatures and pressures. Equally successful on steam, gas, water, oil joints.

Send for particulars

Permac
METAL-TO-METAL JOINTING MATERIAL

Sole manufacturers:—

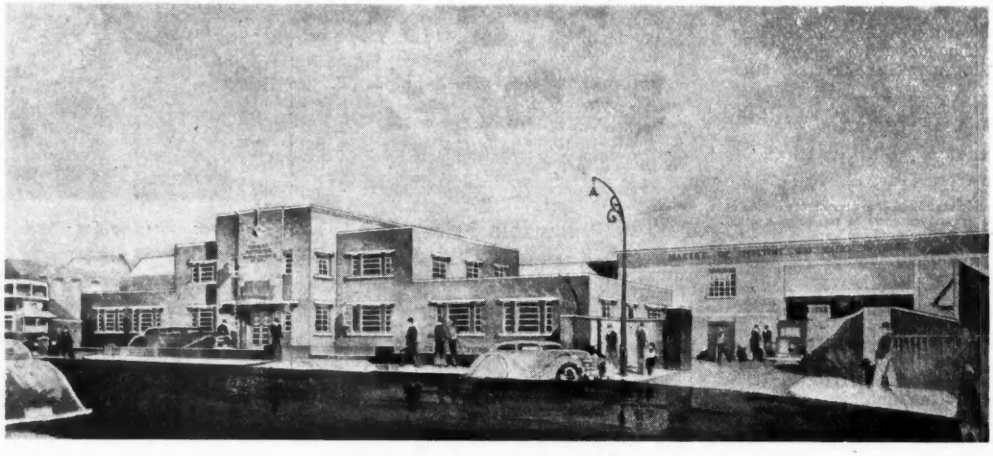
THOMAS & BISHOP LTD.
37, Tabernacle St.
LONDON, E.C. 2
Telephone: Clerkenwell 3351 (2 lines)

DEVELOPMENT OF THE WATER HEATING LOAD

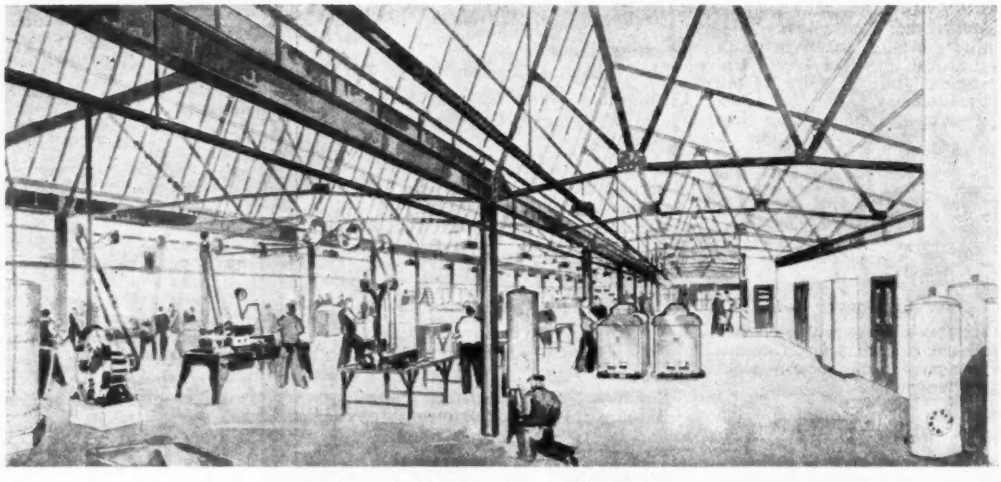
Established in the heating trade at Balham in the middle of last century, long before the advent of gas-fired water heaters, but fully cognisant of the great utility of gas as a fuel for various purposes, the firm of Thomas Potterton has devoted its attention for the past 40 years to the design and manufacture of Gas Water Heaters, Automatic Controls and allied Equipment, accompanied by Research, and special consideration to new methods of application in the Domestic and Industrial fields.

The demand for their various products has increased during the past 10 years and outgrown the capacities of their factories at Ravenswood Road, Kenilford Road, and Lammermore Road, Balham, which have now been superseded by their new works at Wandsworth, where all processes are carried on under one roof.

VISITORS CORDIALLY WELCOMED



The new "Cavendish Works."



An artist's impression of the Factory.

THOMAS POTTERTON (Heating Engineers), LTD.

Registered Office and Works:

20-30 BUCKHOLD ROAD, WANDSWORTH, S.W.18

Telephone: Putney 2263-4-5 *Telegrams:* Potterton, Put, London.

GAS STOCKS AND SHARES

For the first few days of business last week Stock Exchange affairs were still in the doldrums with activity at a very low ebb. Towards the end of the week, however, some markets took a turn for the better and in several directions, particularly among British Funds, prices began to move up.

Business in the Gas market was again very small, and the effect of the general conditions on this section can be seen in the list below and in that overleaf. Not since the crisis in September last have quotations in this market suffered such an all-round marking down. Although gas stocks and shares are popular among a large section of investors, many are closely held and transactions therefore are few and far between, so that on any general rearrangements of values these securities are usually among the last to be affected either up or down.

A comparison of current prices among the leading gas "ordinaries" with those ruling a year ago shows that the depreciations over this period have been in some cases very serious. As regards dividends all the Companies shown in the accompanying list, with one exception, maintained their rates of dividend last year.

Ordinary Stocks.

	Middle Market Prices.		Fall.
	April 22, 1938.	April 21, 1939.	
Alliance and Dublin	145	135	10
Bristol	116	106½	9½
British	140½	127½	13
Cardiff	122½	115½	7
Commercial	85½	53	32½
Croydon Sliding Scale	139½	127½	12
Gas Light Units	23/9	20/–	3/9
Imperial Continental	135½	103	32½
Liverpool	124½	119	5½
Newcastle Units	23/–	21/–	2/–
Portsmouth and Gosport	162½	150	12½
Sheffield	140½	137½	3
South-Eastern Gas Corporation	23/–	21/6	1/6
South Metropolitan	105½	85	20½
South Suburban	120½	105	15½
Southampton	111½	106½	5
Tottenham	128½	119½	9
United Kingdom Gas Corporation	19/6	18/3	1/3
Wandsworth	139½	122½	17

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Ord. ...	130—140	...
374,CCO	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	—3
734,733	Nov. 7	5	5	Asscd. Gas & Water U'd'ts Ord.	17/—19/–	...
500,CCO	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
444,389	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—21/–	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/–	...
500,CCO	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	155—160	...
300,CCO	Apl. 6	1/4½	1/9⅜	Bombay, Ltd.	18/—20/–*	–1/–
181,185	Feb. 20	9½	9½	Bournemouth sliding scale ...	192—202	...
690,526	,,	7	7	Do. 7 p.c. max. ...	153—158	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	128—133	...
50,CCO	Dec. 19	3	3	Do. 3 p.c. Deb. ...	70—75	—3
362,025	,,	4	4	Do. 4 p.c. Deb. ...	92—97	—3
335,CCO	,,	5	5	Do. 5 p.c. Deb. ...	110—115	—3
357,5CO	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	140—145	—1
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	120—125	—4
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	120—125	—3
855,CCO	Mar. 20	7	8	British Ord.	133—143	—3
100,CCO	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	...
350,CCO	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	112—117	...
120,CCO	,,	4	4	Do. 4 p.c. Red. Deb. ...	93—98	—1
450,CCO	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,CCO	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,CCO	22 May '33	6	4	Cape Town, Ltd.	l—2	...
100,CCO	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	l—2	...
150,CCO	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	Feb. 6	6	6	Cardiff Con. Ord.	113—118	—2
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...
98,936	Mar. 20	2/–	2/–	Colombo Ord.	1⅞—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	22/—24/–	...
739,453	Mar. 20	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/–	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/–	...
1,775,005	Jan. 23	5	4	Commercial Ord.	48—58	—2
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	60—65	—2
286,344	Feb. 20	5	5	Do. 5 p.c. Deb. ...	103—108	—5
200,000	,,	6½	4	Do. 3½ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	125—130	—2
644,590	,,	5	5	Do. max. div.	95—100	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	108—113	—2
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c.	90—95	—3
187,215	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	113—118	...
176,211	Dec. 5	5	5	Do. 5 p.c. Deb. ...	110—115	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/–	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,189 963	Feb. 6	5⅜	5⅜	Gas Light & Coke Ord. ...	19/6—20/6a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	70—74	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	87—92	—5
2,993,000	Jan. 9	3½	3½	Do. 3½ p.c. Red. Pref. ...	92—97	—1
8,602,497	Nov. 21	3	3	Do. 3 p.c. Con. Deb. ...	68—73	—2
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110	—½
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	101—106	—2
700,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	—1
270,466	Feb. 20	6	6	Harrogate New Cons. ...	115—120	...
157,500	Mar. 20	‡1/–	‡1/–	Hong Kong and China Ord. ...	⅝—¾	...
213,200	Feb. 6	5⅜	6	Hornsey Con. 3½ p.c. ...	97—102	...
5,600,000	Oct. 24	12	8	Imperial Continental Cap. ...	98—108	—7
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	—1
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	145—155	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	63—68	—5
45,000	Nov. 21	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	130—135	...
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—103	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons. ...	96—101	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	85—90	—5
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	90—95	—2
148,955	,,	5	5	Do. 5 p.c. Deb. ...	107—112	—3
125,CCO	Jan. 3	3½	3½	Do. 3½ p.c. Red. Bds.	94—97	...
675,CCO	Nov. 21	†6	†6	Montevideo, Ltd.	65—70	—5
250,CCO	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	140—145	...
396,160	Feb. 6	5	5	Northampton 5 p.c. max. ...	103—108	—2
300,CCO	Oct. 24	†7	†9	Oriental, Ltd.	145—150	...
468,537	Dec. 5	8	7½	Plymouth & Stonehouse 5 p.c.	130—140	...
621,667	Feb. 20	8½	8½	Portsmouth & Gosport Cons.	145—155	...
241,446	,,	5	5	Do. 5 p.c. max. ...	98—103	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	103—108	...
75,CCO	,,	4	4	Do. 4 p.c. Pref. ...	85—90	—3
114,CCO	Feb. 6	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,CCO	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	8—9	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Mar. 20	–/10⅝	–/10⅝	,, ,, 4½ p.c. Cum. Pref.	19/—21/–	...
133,201	Mar. 6	8½	5	Shrewsbury 5 p.c. Ord. ...	141—146	...
9,CCO	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅝	1/2⅝	South East'n Gas Cn. Ld. Ord.	20/6—22/6	—/6
871 636	Mar. 6	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/–	...
450,CCO	Feb. 6	4	4	Do. 4 p.c. Deb.	95—100	—1
150,CCO	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	—3
6,7C9,695	Feb. 6	5	6	South Met. Ord.	50—50	—5
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	118—123	—4
850,CCO	,,	4	4	Do. 4 p.c. Irred. Pref. ...	85—90	—5
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	67—72	—4
1,CCO,CCO	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	104—108	—1
€CO,CCO	,,	§31/–	3½	Do. 3½ p.c. Red. Deb. ...	93—98	—4
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	100—110	—2½
512,825	,,	5	5	Do. 5 p.c. Pref.	103—108	...
5CO,CCO	,,	4	4	Do. 4 p.c. Pref.	85—90	—5
250,CCO	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	90—95	—1
888,567	Dec. 5	5	5	Do. 5 p.c. Deb.	107—112	—1
250,CCO	,,	4	4	Do. 4 p.c. Deb.	90—95	—3
2CO,CCO	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Apl. 6	9⅜	1/2½	S. Western Gas & Water Ord.	15/6—17/6*	...
160,523	Apl. 6	–/10⅜	–/10⅜	Do. 4½ p.c. Red. Cum. Pf.	18/6—20/6*	...
110,CCO	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	—2
750,541	Feb. 6	5	5½	Southampton Ord. 5 p.c. ...	104—109	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	—3
350,CCO	Feb. 6	5½	5½	Swansea 5½ p.c. Red. Pref. ...	104—109	...
2CO,CCO	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	—2
1,076,490	Feb. 20	6½	6½	Tottenham and District Ord.	117—122	—3
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	112—117	—1
62,235	,,	5	5	Do. 5 p.c. Pref.	103—108	...
453,3E0	Dec. 5	4	4	Do. 4 p.c. Deb.	90—95	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	17/9—18/9	...
1,051,2E0	Nov. 7	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	18/6—20/6	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	18/6—20/6	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	14/6—16/6	—1/–
1,066,186	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—98	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	122—127	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	120—125	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	85—90	—4
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	107—112	—1
383,745	,,	4	4	Do. 4 p.c. Deb. ...	90—95	—2
4CO,CCO	,,	§25/–	3½	Do. 3½ p.c. Red. Deb. ...	93—98	—3
558,342	Feb. 6	6½	6½	Watford and St. Albans Ord.	125—130	—2
2CO,CCO	,,	5	5	Do. 5 p.c. Pref. ...	102—107	—1
2CO,CCO	,,	5½	5½	Do. 5½ p.c. Pref. ...	110—115	...
2CO,CCO	,,	§16/8	4	Do. 4 p.c. Rd. Pf. (1973/8)	93—98	—2
1CO,CCO	,,	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
2CO,CCO	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	+2
2CO,CCO	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	—2

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations April 21.	Rise or Fall on Week.
202,152	Mar. 20	5	5	Ascot Ord.	99—104	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	102—107	...
31,035	Mar. 20	–/4⅜	–/4⅜	Associated Utilities 4 p.c. Pref.	15/—17/–	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 20	8	8	Bognor Orig. Ord. 'A' ...	142—152	—10
62,210	,,	8	8	Do. New Addl. 'A' ...	142—152	—10
87,160	,,	7	7	Do. New 7 p.c. max. ...	140—150	—2
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	183—193	...
125,970	,,	7	7	Do. 7 p.c. max.	131—136	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	93—98	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	91—96	...
130 000	Dec. 19	4	4	Do. 4 p.c. Deb.	92—97	—1
65,000	Mar. 6	7½	7½	Eastbourne 'A' 5 p.c. ...	122—132	...
198,000	,,	6	6½	Do. 'B' 3½ p.c.	105—115	...
112,312	,,	5	5	Do. 5 p.c. Pref.	102—107	...
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	107—112	—1
24,000	Feb. 20	8½	8½	Great Yarmouth 8½ p.c. max.	30—35	...
59,400	,,	7½	7½	Do 7½ p.c. max.	27—32	...
51,160	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	117—122	...
152,600	Feb. 20	8	9	Guildford Cons.	160—165	...
54,055	,,	5	5	Do. 5 p.c. Pref.	102—107	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	—4
156,600	Feb. 20	7½	7½	Hampton Court Cons. ...	120—125	...
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref. ...	85—90	—5
60,000	,,	6	6	Do. 6 p.c. Pref.	118—123	—2
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	87—92	—3
73,620	Mar. 6	8¾	8¾	Luton Cons. 'A'	150—160	...
107,960	Mar. 20	4	5½	Mid Kent Ord.	8½—9½	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	192—197	...
47,112	,,	5	5	Do. 5 p.c. Pref.	102—107	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	Nov. 7	7½	7½	Peterborough Ord.	137—142	...
64,990	Mar. 6	7½	7½	Redditch Ord....	115—125	...
166,850	Feb. 6	8	8	Romford Ord....	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Mar. 20	5	5	Do. 5 p.c. Deb.	107—112	—1
25,570	Feb. 6	5½	5½	Rugby 5½ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	115—120	—2
110,950	Feb. 20	8	8	Ryde Ord.	137—147	...
270.086	Mar. 20	7	7	Slough Ord.	126—131	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	—2
28,872	Nov. 7	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	17/—19/–	...
28,866	Mar. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/–	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	105—110	—3
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	—3
130,000	Feb. 6	5	8	Wakefield Ord.	116—121	...
81.650	,,	5	5	Do. 5 p.c. max.	92—97	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
98,384	Feb. 6	6	6	Wolverhampton 6 p.c. Pref.	115—120	...
160,000	Dec. 19	5½	5½	Do. 5½ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	102—107	...
133,640	Feb. 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
35,000	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	112—117	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max. ...	105—108	—2
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	115—118	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max.	95—97	...
13,200	Mar. 20	7	8⅝	Pontyp'l Gas & W. 10 p.c. 'A'	12⅝—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12	...
140,778	Feb. 6	5	5	Weston-super-Mare Cons. ...	103½—105½	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb ...	97—101	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.... ...	118—120	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.... ...	99—101	—1
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	157½—158½	...
732,000	Feb. 20	3	3	Hartlepool G. & W. Cn. & New	69—71	...
2,061,315	Feb. 6	5	5⅝	Newcastle & Gateshead Con.	20/9–21/3a	—/6
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—101	...
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	88—89	...
277,285	Oct. 24	5	5	Do. 5 p.c. Deb. '43 ...	103—105	—1
332,351	Feb. 6	6	6	Sunderland 6 p.c. max. ...	132½—134½	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations April 21.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	136—139	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.
* Ex div.

PUBLISHERS' NOTICE

TERMS OF SUBSCRIPTION

United Kingdom & Ireland: Advance Rate, 35/- per annum; 18/- per half year. Credit Rate: 40/- per annum; 21/- per half year.
Dominions & Colonies & United States: 35/- per annum, in advance. Other countries in the Postal Union, 40/- per annum, in advance.

A copy of the "G.J." Calendar and Directory is presented to continuous subscribers.

CLASSIFIED ADVERTISEMENTS

Situations Wanted, 6d. a line (minimum 3/-, about 36 words). Situations Vacant, Plant for Sale and Wanted, Contracts, Public Notices, Educational, &c., 9d. a line (minimum 4/6). Financial Notices, 1/- per line. Box Number, 6d. extra.

WALTER KING, LTD.,

Telephone: Central 2236-7-8. 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4. Telegrams: Gasking, Fleet, London.